

**A Case Study in Knowledge Translation:  
Developing a Conceptual Framework to Evaluate the Role of Information and  
Communication Technology on Linkage and Exchange Processes  
in Distant Drug Policy Groups**

by

Mowafa Said Househ

Bachelor of Commerce, University of Alberta, 1999

Master of Engineering, University of Toronto, 2000

A Dissertation Submitted in Partial Fulfillment  
of the Requirements for the Degree of

DOCTOR OF PHILOSOPHY

in Health Information Science

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University of Victoria

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## **Supervisory Committee**

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Supervisor

Dr. Malcolm Maclure, School of Health Information Science  
Co-Supervisor

Dr. Denise Cloutier-Fisher, Department of Geography  
Outside Member

Dr. Bruce Carleton, Faculty of Pharmaceutical Sciences, University of British Columbia  
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## Abstract

### Supervisory Committee

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### *Background*

Linkage and exchange refers to processes by which researchers and decision-makers are engaged in ongoing interaction, collaboration, and the transfer of ideas and are a critical aspect of collaborative research partnerships (CHSRF, 2008). As healthcare groups continue to communicate and collaborate at a distance through linkage and exchange, Information and Communication Technology (ICT) has come to play an increasingly important role in supporting such interactions. However, to date, the literature on linkage and exchange appears disconnected from that of ICT. Research on the effects of ICT on linkage and exchange processes is needed for healthcare in general, but, more specifically, within the drug policy domain. This study examines the consequences of ICT on linkage and exchange processes within the drug policy domain.

### *Methodology*

This study seeks to understand the effects of ICT on linkage and exchange processes. An initial conceptual framework emerged from the research literature of both ICT and linkage and exchange. The framework focused on describing inputs, processes, and outputs involved in linkage and exchange. The inputs were communication media, tasks, group characteristics, context, and culture. The processes included social

interactions, facilitation, and information exchange. The outputs consisted of participant ratings of the technology-enabled linkage and exchange processes.

Three different groups working within the drug policy domain were observed for over two years. Five different types of data were collected in the study: baseline interviews, observations, meeting transcripts, post-interviews, and surveys. Analysis of the study results in the context of the initial conceptual framework led to a more refined conceptual framework.

### ***Findings***

Three linkage and exchange processes were studied: social interaction norms, facilitation, and information exchange. The findings regarding social interaction norms suggest that: 1) groups developed different discussion and participation norms when using different communication media; 2) a rigid web-conferencing communication structure forced group members to introduce other tools for communication; 3) group discussions were perceived as best in face-to-face environments and worst in teleconferencing; 4) teleconferencing provided the most convenient method of participation; 5) web-conferencing was the most effective way to facilitate linkage and exchange for groups that had limited budgets, that were greatly dispersed, and that were highly collaborative; 6) web-conferencing forced group interaction within text.

Findings regarding facilitation suggest that: 1) process facilitation skills were essential to the success of the group irrespective of technology; 2) more technological features required more effort from facilitators; 3) facilitator control of a meeting was highest during web-conferencing meetings; 4) disseminating research required little or no process facilitation expertise.

Findings regarding information exchange suggest that: 1) technology and presentation structure had a strong influence on information sharing, but little on evidence sharing; and 2) the research task had the strongest effect on the level of evidence used within the group.

### ***Conclusion***

ICT has a significant effect on linkage and exchange processes. This study discusses the implications of the thesis for both underlying theory and the practical development of technology to support linkage and exchange.

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Acquire knowledge: it enables its possessor to distinguish right from the wrong, it lights the way to heaven; it is our friend in the desert, our society in solitude, our companion when friendless—it guides us to happiness; it sustains us in misery; it is an ornament among friends and an armor against enemies. —Prophet Muhammad (PBUH).

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## **Dedication**

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## Abbreviations

AST	Adaptive Structuration Theory
CADC	Canadian Academic Detailing Collaborative
CADTH	Canadian Agency for Drugs and Technologies in Health
CCOHTA	Canadian Co-ordinating Office of Health Technology Assessment
CHSRF	Canadian Health Services Research Foundation
CIHI	Canadian Institute for Health Information
CIHR	Canadian Institute for Health Research
COMPUS	Canadian Optimal Medication Prescribing and Utilization Service
DPF	Drug Policy Futures
EQIP	Education for Quality Improvement of Patient Care
GDSS	Group Decision Support Systems
ICT	Information and Communication Technology
KB	Knowledge Brokering
KT	Knowledge Translation
TELE	Technology-enabled Linkage and Exchange
TIP	Time Interaction Performance

## Chapter 1: Introduction

Within the healthcare field, a growing interest in the use of information and communication technologies (ICT) encourages decision-makers and researchers to form collaborative research partnerships. Such partnerships are engaged in information exchange, synthesis, and the application of research. The Canadian Institute for Health Research refers to this as knowledge translation (KT) and defines it as:

The exchange, synthesis and ethically-sound application of knowledge—within a complex system of interactions among researchers and users [e.g., policy decision-makers]—to accelerate the capture of the benefits of research for Canadians through improved health, more effective services and products, and a strengthened health care system. (CIHR, 2002)

For knowledge translation to work, collaborative research partnerships need to ensure that the process of ongoing interaction, collaboration, and exchange of ideas is successful. Applying a more formal definition, the Canadian Health Services Foundation (CHSRF) refers to this process as linkage and exchange and defines it as:

The process of ongoing interaction, collaboration, and exchange of ideas between the researcher and decision-maker communities. In specific research collaboration, it involves working together before, during, and after the research program. (CHSRF, 2008)

If linkage and exchange is not successful, it could result in the failure of the knowledge translation process (Poulos, Zwi, & Lord, 2007).

In the past, Canadian researchers and decision-makers have engaged in linkage and exchange activities primarily in face-to-face settings. Earlier research in KT has

focused on the creation of face-to-face communication linkages and information exchange mechanisms between researcher and decision-maker, using information disseminators (Sundquist, 1978) or on increasing interactions between decision-makers and researchers (Huberman, 1990). Consequently, the literature on linkage and exchange within the framework of knowledge translation has not, to date, fully examined the potential role of ICT to support linkage and exchange between groups working at a distance from one another.

A meaningful area that lends itself to the study of the consequences of the use of ICT on KT linkage and exchange processes is the drug policy domain. The drug policy domain places importance on forming collaborative researcher and decision-maker partnerships through linkage and exchange (Milbank Memorial Fund, 2001). In Canada, the need to form linkages and exchanges between drug policy groups is critical to address the drug cost crisis, where, in 2007, Canadian drug expenditures amounted to \$27 billion, approximately 16.8% of total healthcare spending (CIHI, 2007).

One way drug policy groups have been working to contain rising drug costs is by supporting researchers and decision-makers in collaborating and using research evidence to formulate drug policy decisions. For this to occur, research suggests that an increase in communication linkages and information exchanges between drug plan programs and research-based institutions is needed (Soumerai et al., 1997). A positive example of such researcher and decision-maker collaboration occurred in 1995 when the British Columbia Reference Based Pricing (RBP) policy set up a mechanism involving face-to-face interaction between researchers and decision-makers in order to produce evidence that informed drug policy decisions. The implementation of RBP led to \$30 million in cost

savings during the first year alone (Maclure & Potashnik, 1997). These results demonstrated the benefits of creating face-to-face communication linkages and information exchanges between drug policy researchers and decision-makers within drug policy programs. The promising results from this program have led to considerable interest in forging more collaborative partnerships between researchers and decision-makers within the drug policy domain to enhance drug policy decision-making. However, with the growth of ICT and its potential to transform a group's capacity to collaborate, drug policy organizations need to understand the influence of ICT on linkage and exchange processes as well as to create guidelines to help researchers and decision-makers to better communicate while using ICT.

In 2004, the Canadian Optimal Medication Prescribing and Utilization Service (COMPUS) was created to develop more effective drug policy and services to encourage the use of information in decision-making among healthcare providers and consumers formulation for drug plans. One of COMPUS' mandates is to facilitate communication linkages and information exchanges between health researchers, drug policy decision-makers, and physician educators. Its purpose was to produce best practices information for health care providers and to improve drug prescribing and use among patients and consumers. Because drug policy is a complex political and clinical domain, a nationally funded organization, such as COMPUS, was seen as necessary; it provided the coherence required to coordinate the efforts of provincial drug policy groups working to improve drug prescription and use.

COMPUS needs to invest in various forms of ICT to facilitate communication linkages across distance and information exchanges between researchers, drug policy

decision-makers, and physician educators. For the COMPUS initiative to succeed, the use of traditional face-to-face communication for linkage and exchange must be augmented with ICT because participant groups are geographically dispersed. How ICT will influence linkages and the exchange process within drug policy compared to face-to-face communication is presently unknown.

### ***1.1 Study Objectives***

This study seeks to 1) improve understanding of the effects of ICT on linkage and exchange processes and 2) provide guidance on how to use ICT to facilitate drug policy group interactions. To help organize research on the consequences of ICT on linkage and exchange, a conceptual framework has been introduced to study technology-enabled drug policy groups within their naturalistic settings. In the literature, conceptual frameworks are referred to as organizers of information to guide the research process (Shields & Tajalli, 2006). Conceptual frameworks are hypothetical and are created to help focus the researcher on the complexities surrounding real-life problems that occur within their naturalistic settings (Shields & Tajalli, 2006). Therefore, an integrative approach and an application of a conceptual framework in natural field settings may improve understanding of how ICT can influence linkage and exchange processes among drug policy groups. It is hoped that organizations, such as COMPUS, will be able to use the conceptual framework to create a linkage and exchange strategy for drug policy groups using ICT.

It is important to note that this study did not focus on the knowledge translation activities that occur in the synthesis or raise the issue of an ethically sound application of

knowledge. Rather, the study focused on linkage and exchange processes. These other aspects of knowledge translation are subjects of considerable research in their own right.

### *1.2 Study Rationale*

Currently, various forms of ICT are becoming prominent in communication technology. These include desktop conferencing, videoconferencing, group decision support systems (GDSS) in both face-to-face and virtual environments as well as collaborative technologies, such as document management, application sharing, desktop sharing, white boarding, and co-browsing. The proponents of these systems have noted that they improve task performance, decision-making, and collaboration in groups (Hollingshead, McGrath, & O'Conner, 1993).

As healthcare groups continue to communicate and collaborate through linkage and exchange at a distance, ICT will play a larger role in supporting such interactions. However, to date, the literature on linkage and exchange has usually remained separate from that of ICT. The linkage and exchange field has not fully examined the potential role of ICT in supporting distance linkage and exchange between health groups in general and within drug policy groups specifically.

To help knowledge translation organizations develop a strategy for technology-enabled linkage and exchange, this study seeks to answer the following research questions:

1. Does ICT have an effect on linkage and exchange processes in drug policy groups?
2. What are the effects of different types of ICT on linkage and exchange processes?

3. How should linkage and exchange processes be operationalized in the conceptual framework?

### ***1.3 Definition of Terms***

The thesis relies on knowledge of various terms and concepts. Definitions of these terms and concepts follow:

*Information and Communication Technology (ICT).* Information and Communication Technology refers to those technologies that enable groups and individuals to communicate, collaborate, and interact in order to share information through various technological media, including e-mail, conferencing (telephone, video and web), GDSS, and discussion forums. Many ICT tools, such as PowerPoint, are also included in this definition.

*Web-conferencing.* Web-conferencing describes live meetings over the Internet. During the meeting, group members use computers to communicate with other participants synchronously. To attend a web-conference, group members log into a website address, using their name. To access the technology, participants typically download an application to the local computer. This study used Elluminate Live V-Class for web-conferencing. The technology allowed users to upload agendas, utilize whiteboard, instant text message, record voting and polling of participants, express emoticons, raise hands to indicate a wish to speak, and see participant names.

*Teleconferencing.* Within this study, teleconferencing signifies the use of audio conferencing involving telephones. The study used TELUS's audio teleconferencing technology. The technology provided an audio only communication medium, where multiple participants could speak at the same time. There was no video or other

communication media. To use the technology, the participants dialled a telephone number and entered a conference code. They were prompted to say their name; in addition, a beep sounded to let other participants know that a new participant had joined the meeting.

*Knowledge Translation (KT).* Knowledge Translation refers to a collaborative research process that involves both researchers and decision-makers who engage in information exchange, synthesis, and application of research as a result of collaborative research efforts (CIHR, 2002). It emphasizes and requires applying knowledge and translating knowledge into action to capture the benefits of research.

*Knowledge Exchange.* Knowledge exchange refers to collaborative problem solving between researchers and decision-makers that happens through linkage and exchange (CHSRF, 2008).

*Knowledge Transfer.* Knowledge transfer refers to “conveyance of knowledge from one place, person, or ownership to another. It involves two or more parties and there has to be a source and a destination” (Syed-Ikhsan & Rowland, 2004).

*Linkage and Exchange.* Linkage and exchange describes a process in which researchers and decision-makers engage in ongoing interaction, collaboration, and exchange of ideas (CHSRF, 2008). Linkage and exchange also involves researchers and decision-makers working prior to, during, and after the research program (CHSRF, 2008).

*Knowledge Brokering.* Knowledge brokering describes an activity in which a set of actors, known as knowledge brokers, work to bring people together through network building efforts; help facilitate knowledge exchange within an organization; develop new

research; apply solutions within an organization; and evaluate changes put in place (CHSRF, 2004). This study considers two types of knowledge brokering roles: a dissemination facilitator and a process facilitator. The literature review section of the thesis explains the differences between the two.

*Group process.* Group process refers to the interactions required for a group to complete a task or to arrive at a decision (Huang & Wei, 2000).

*Outputs.* In healthcare literature, outputs are referred to as “the direct products or services from the [process] of a policy, program, or initiative, and are delivered to a target group or population” (CHSPR, 2004). Output measures are a result of a process and can be measured qualitatively or quantitatively to provide evidence that the initiative delivered took place.

*Outcomes.* In health care literature, outcomes are referred to as “significant external consequences attributed to an organization, policy, program or initiative, and can be described as immediate, intermediate or final; direct or indirect; and intended or unintended” (CHSPR, 2004). Outcomes are used to assess the changes or benefits in a program, initiative, or activity that occur because of outputs (McLaughlin & Jordan, 1999). Outcomes can also be measured over time, allowing an examination of the immediate, intermediate, and long-term effects of an initiative.

#### ***1.4 Summary of Chapters***

The thesis is organized into six chapters. Chapter 1 contains the introduction to the thesis. Chapter 2 includes a review of the literature on knowledge translation, linkage and exchange, and ICT. Chapter 3 details the study’s method of research, subjects, materials, procedures, data collection, and data analysis. Chapter 4 reports the study

results. Chapter 5 presents discussions, findings, implications, and suggestions for further research. Chapter 6 presents the conclusions.

## **Chapter 2: Literature Review**

### ***2.1 Overview of the Literature***

The literature review first describes the knowledge translation process. Second, the literature review presents a discussion on the role of ICT in the research process. Third, to clarify the general effects of technology on group processes, the review includes a survey of ICT literature. Fourth, the review focuses on the knowledge translation literature and narrows down the specific group processes relevant to linkage and exchange (social interactions, information exchange, and facilitation). Once the linkage and exchange processes are identified (social interactions, information exchange, and facilitation), the review looks at the consequences of ICT on similar group processes. Finally, the literature review lays the foundation for the development of the study's initial conceptual framework.

### ***2.2 Collaborative Research Processes in Health Care***

Traditionally, researchers have been the source of ideas that direct the research process, while users of research, such as policy decision-makers, have been receivers of research results (Landry, Lamara, & Amari, 2001). This view of the research process assumes that decision-makers will search for research information in academic journals and use it to inform or guide policy decisions (Lomas, 2000). However, research studies alone may be insufficient to inform or guide policy decisions (Landry, Lamara, & Amari, 2001).

To make research results more relevant to decision-making needs, researchers and policy decision-makers are beginning to collaborate more often on research projects. Policy decision-makers are now included in the formulation of research questions,

methods, and the publication of research results. Proponents claim that communication linkages and information exchanges between researchers and policy decision-makers during the research process make research results increasingly relevant to decision-making needs (Lomas, 2000). However, research process models have not accounted for policy decision-maker and researcher interaction during the research process.

Research process models remain focused on the researcher as the source of ideas and direction throughout the research process. For example, Anson et al. (1996) described an adapted research process model that is generic and non-sequential. The authors demarcated eight research processes: 1) generating ideas; 2) conducting library research; 3) refining the research topic; 4) planning a research strategy; 5) specifying a research design; 6) collecting data; 7) analyzing data; and 8) publishing research results. Varkevisser, Pathmanathan, and Brownlee (2003) proposed a specific research model for conducting health research and proposal development. The steps outlined in their model include 1) selecting, analyzing, and stating the research problem; 2) reviewing the literature; 3) formulating the research objectives; 4) outlining the research methodology; 5) describing the work plan; 6) budgeting; 7) planning for project administration and utilization of results; and 8) providing a proposal summary. Booth, Colomb, and Williams (2003) described a simpler approach to the research process beginning with: 1) understanding the problem; 2) developing a research question; 3) researching the problem; 4) answering the research question; and 5) applying the findings to solve the problem. None of these research process models includes consideration of decision-maker input in the process; as a result, opponents have criticized these traditional research approaches for not producing relevant research that can be used by decision-

makers to solve real world problems (Lomas, 2000).

In 2002, the Canadian Institute for Health Research (CIHR) introduced a knowledge translation research process model. In this model, researchers and decision-makers are the source of ideas and direction in the research process; the model recognizes the influence of decision-makers early in the research process. The Institute defines knowledge translation functionally:

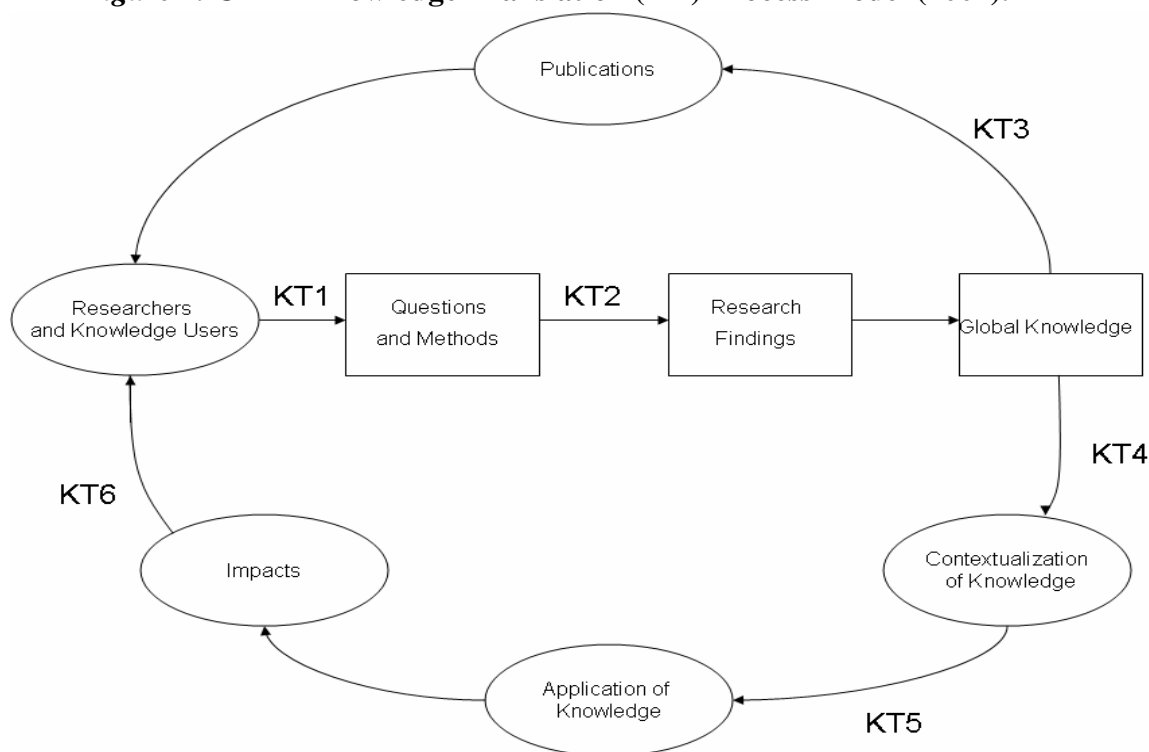
[Knowledge translation is] the exchange, synthesis and ethically-sound application of knowledge—within a complex system of interactions among researchers and users [e.g., policy decision-makers]—to accelerate the capture of the benefits of research for Canadians through improved health, more effective services and products, and a strengthened health care system. (CIHR, 2002)

This definition makes it clear that knowledge translation is a collaborative research process, requiring communication linkages and information exchanges between researchers and decision-makers not only at the policy level, but also at clinical and managerial levels. The goal of these interactions is to produce research studies relevant to issues that decision-makers face and that can be used to inform policy decisions and subsequent research directions.

To guide decision-makers and researchers working on collaborative research projects, CIHR introduced a knowledge translation research model composed of six steps. Communication linkages and information exchanges between researchers and decision-makers occur throughout the entire research process (see Figure 1). The steps are: KT1) defining research questions and methodologies; KT2) conducting research; KT3) publishing research findings in plain language and accessible formats; KT4)

placing research findings into the context of other knowledge and socio-cultural norms; KT5) making decisions and taking action informed by research findings; and KT6) influencing subsequent rounds of research based on the results of knowledge use.

**Figure 1. CIHR Knowledge Translation (KT) Process Model (2002).**



[Source: Canadian Institute for Health Research <http://www.cihr-irsc.gc.ca/e/29418.html> ]

To facilitate the process of linkage and exchange between researchers and decision-makers working within the CIHR knowledge translation model, the Canadian Health Services Research Foundation (CHSRF) introduced the concept of the knowledge broker. Knowledge brokering is playing an increasingly important role in promoting linkage and exchange between researchers and decision-makers. Originally, the knowledge broker acted as a go-between for decision-makers and researchers within an organization. The knowledge brokering role has since evolved to a function carried out by a set of actors working within an organization to facilitate linkage and exchange (CHSRF, 2004). The knowledge brokering function includes bringing people together

through network building efforts; helping facilitate knowledge exchange within the organization; developing new research; applying solutions within the organization; and evaluating changes put in place (CHSRF, 2004). People working as knowledge brokers must be “flexible, curious, and well-informed on all aspects of a given sector, able to make links among a range of ideas and bits of information” (CHSRF, 2004). CHSRF (2004) suggests that when presenting research evidence to decision-makers, the knowledge broker should be able to identify credible researchers to present and ensure that they provide important messages immediately; use plain language; focus on implications of research; mention the limitations of research; and use humour and style in the presentation.

A comparison of traditional researcher centered research approaches with the collaborative decision-maker-researcher approach that CIHR and CHSRF advocate reveals important differences. The CIHR model introduces new research processes not found in the traditional research approaches, such as including the publication of research results in plain language formats; making decisions and taking action informed by research findings; placing research findings into the context of other knowledge and socio-cultural norms; and influencing subsequent rounds of research based on the results of the research. Furthermore, to help facilitate the CIHR knowledge translation process, CHSRF introduced the concept of a knowledge broker who facilitates linkages and exchanges between researchers and decision-makers. These are new research processes promoted by CIHR and CHSRF to reflect the importance of making research results more accessible and relevant to decision-makers. The next section discusses the role of technology in facilitating the research process.

### ***2.3 Technology Use in the Research Process: A Health Informatics Perspective***

The increasing demand for linkage and exchange between researchers and decision-makers underlies the need for the development of new tools to facilitate cooperation between these two groups. For years, researchers have used e-mail, telephone, video and web-conferencing, and group decision support systems to coordinate the communication required to promote research collaboration (Russel, 2001). Some of the first research groups to use ICT for communication and collaboration were in the fields of physical oceanography, worm genomics, and space physics (Teasley & Wolinsky, 2001). The field of health informatics includes two well-known research collaboratives: HealNet and InterMed Collaboratory.

HealNet (1995-2002) was a national network of Canadian researchers from the health, social, and applied sciences whose primary aim was to improve the health of Canadians by making research knowledge available to healthcare decision-makers. The research network was composed of 20 universities, 31 private sector companies, five federal departments, 24 provincial departments, and 29 other organizations (HealNet, 1999). However, a review of the annual reports on the HealNet website and a search on PubMed did not reveal any formal evaluation studies on the use of ICT in the linkage and exchange process between researchers and decision-makers collaborating in the network.

Patel et al. (1999) and Shortliffe et al. (1998) have extensively evaluated the use of ICT in the InterMed Collaboratory. The InterMed Collaboratory (1994-1998) was a research collaboration involving five medical institutions in the United States and one in Canada with the objective of developing and sharing software system components and procedures to support the goals of three health informatics research projects. InterMed

also had a second objective—to provide clinical applications, guidelines, and knowledge bases for clinical, administrative, and educational purposes. The studies by Patel et al. (1999) and Shortliffe et al. (1998) focused on how researchers collaborated using various communication media, such as e-mail, teleconferencing, and face-to-face meetings. The authors did not discuss researcher decision-maker interactions.

As important as the work of Patel and colleagues has been for understanding how research groups collaborate using ICT within healthcare, a gap in the health informatics literature remains, that is, evaluating the effects of ICT on researcher and decision-maker linkage and exchange activities. For example, the InterMed Collaboratory did not consider linkage and exchange between researchers and decision-makers; rather, it focused on researcher collaboration. Even though HealNet intended to improve researcher and decision-maker collaboration, it provided no formal evaluations of the collaborative linkage and exchange process using ICT. Consequently, developing a conceptual framework for evaluating group processes is necessary for knowledge translation organizations, such as COMPUS, CIHR, and CHSRF, whose job it is to facilitate linkage and exchange between decision-makers and researchers. Such a framework will help these organizations develop linkage and exchange strategies to support distance communication between decision-makers and researchers.

To understand how ICT literature has conceptualized the study of technology within groups, it is important to undertake a review of various group theories and conceptual models discussed in such literature. Because the literature on ICT is rich, numerous conceptual models and variables are available.

#### ***2.4 Theories and Conceptual Models for Evaluating Technology-Enabled Groups***

Many group process theories receive consideration in the ICT literature; one that is relevant to this study is that of Adaptive Structuration Theory (AST). This group process theory has been used in the ICT literature to explain the effects of ICT on group processes.

Adaptive Structuration Theory (AST) relates more specifically to the use of ICT and its effect on group processes. Developed by DeSanctis and Poole (1994), AST argues that the use of information technologies over time introduces structures that influence the rules and resources that organizations use for social interactions. The concepts of structuration and appropriation are important aspects of AST. Structuration “refers to the process by which systems are produced and reproduced through [a] member’s use of rules and resources” (Poole & DeSanctis, 1989). Appropriation is the “fashion in which a group uses, adapts, and reproduces a structure” (Anson, Bostrom, & Wynne, 1995). Three dimensions affect how a group appropriates a structure: faithfulness, attitudes, and level of consensus (Anson, Bostrom, & Wynne, 1995). For example, a structure imposed by a technology will have its desired effect if used in accordance with the design principles (faithfulness); if the members of the group do not react negatively to the technology (attitude); and if the members agree on how the technology should be used (consensus). Hence, AST is designed to explain how groups adapt to the structures and rules of the technology used in the group process.

In addition to group theories, various ICT research streams, such as Group Decision Support Systems (GDSS), Virtual Networks, Computer Mediated Communication, and Computer Supported Co-operative Work, have proposed conceptual

models used to evaluate inputs, processes, and outcomes in technology-enabled groups. Most of these ICT sub-streams are similar, sometimes using terms interchangeably. Here, the literature review focuses on the various conceptual models proposed in ICT literature for studying the use of ICT within groups. The discussion focuses on the GDSS literature since it is one of the most established and most developed research streams studying the consequences of the use of ICT in groups.

A GDSS is a computer-based system used to improve communication within groups (Zigurs, Poole, & DeSanctis, 1988). The first GDSS system was created in the 1980s at the University of Arizona Management Information System department. In the past twenty years, the field has seen approximately 230 papers published in academic, peer reviewed information system journals, but only a few studies have directly explored the effects of a GDSS on group processes (Huang & Zhang, 2004). Most of the GDSS literature has focused on measuring group process outcomes, such as satisfaction, cohesion, trust, and decision-making (Zigurs, Poole, & DeSanctis, 1988) and on group inputs, such as task, technology, group characteristics, and context (Dennis, Nunamaker, & Vogel, 1991). In the introduction, the term outcome was defined as an assessment of changes to a program, initiative, or activity. There is a large literature within ICT that focuses more on process outcomes; fewer studies look at in-depth group processes.

Nunamaker et al. (1991) offer a conceptual model that has been used extensively in the GDSS literature. In this model, group processes that affect group outcomes are mediated by a series of four input variables: task, context, technology, and group characteristics. These inputs affect group processes characterized by either group process losses or group process gains. Process gains are group processes that improve meeting

outcomes, including more information, synergy, learning, and objective evaluation. Process losses have a negative affect on meeting outcomes and result in coordination problems, information overload, socializing, free riding, and failure to remember. The effects of the inputs on group process gains and losses influence the results of group outcomes, such as group effectiveness, efficiency, satisfaction, outcome quality, and confidence with the outcome. Thus, the Nunamaker et al. (1991) conceptual model for studying groups that use a GDSS includes not only the consequences of technology on group processes and outcomes, but also other situational dimensions, such as context, group characteristics, and tasks (Hinssen, 1998).

Like Nunamaker et al. (1991), Pinsonneault and Kraemer (1989) developed a conceptual model to study the effects of a GDSS on group decision-making processes and decision-making outcomes. They included similar contextual input variables, but discussed them at a broader level (Hinssen, 1998). The model examines how contextual input variables (personal factors, situational factors, group structure, technological support, and task characteristics) interact with group decision-making processes to influence both tasks and group-related outcomes. The group processes proposed in this model include: decisional characteristics (depth of analysis, participation, consensus reaching, and time to reach the decision); communication characteristics (clarification efforts, efficiency of communication, non-verbal communication, and task oriented communication); interpersonal characteristics (co-operation, domination of a few members); and structure imposed by the technology. Outcomes proposed in the model include attitude toward the group process (satisfaction and willingness to work in a group in the future); characteristics of the decision (quality, variability of the quality over time,

and breadth); implementation of the decision (cost, ease, and commitment of group members); attitude of group members toward the decision (acceptance, comprehension, satisfaction, and confidence). Like Nunamaker et al. (1991), Pinsonneault and Kraemer (1989) use inputs, such as technology, group characteristics, context, and task. However, both processes and outcomes are different since Pinsonneault and Kraemer's (1989) model specifically focused on decision-making processes and outcomes.

Similarly, Sambamurthy, Poole, and Kelly (1993) introduced a conceptual model that examines how the communication structures of a GDSS affect the group decision-making process. The input variables used in the model are tasks, group characteristics, technology, and communication structures. Communication structures are characterized as the type of communication support (computerized vs. non-computerized), temporal frame (synchronous vs. asynchronous), and type of group supported (face-to-face vs. distributed). The input variables proposed in the model in turn affect GDSS decision-making processes: the amount of communication, task focus, influence processes, depth of analysis in discussions, structure of work process, and performance of communication requirements. The inputs and processes then affect decision-making outcomes, such as decision quality, consensus change, confidence, and perceived quality and satisfaction with the decision process.

Straus (1997) introduces a model simpler than any proposed by Nunamaker et al. (1991), Pinsonneault and Kraemer (1989), and Sambamurthy, Poole, and Kelly (1993). The author examined only one input variable, communication medium (conferencing technology or face-to-face), without a focus on contextual variables that the previous models included. The model considered how communication medium input modes

(conferencing technology vs. face-to-face) affect group communication processes, such as total task communication and non-task communication, task focus, supportive communication, disagreement, personal attacks, and distribution of participation. The input and process variables affect the group outcomes of cohesiveness, satisfaction, and productivity.

This review of theories and conceptual models suggests that numerous variables may be applied to group inputs, processes, and outcomes in the study of the use of ICT in groups. So far, over 80 inputs, processes, and outcomes have been introduced in a review of merely four conceptual models and two theoretical models. To include all these variables in the conceptual framework is neither feasible nor necessary for evaluating the linkage and exchange process of distant technology-enabled drug policy groups. However, the conceptual models offered a number of common input variables. Pinsonneault and Kraemer (1989), Sambamurthy et al. (1993), and Nunamaker et al. (1991) considered group task as an input into the group process. Nunamaker et al. (1991), Pinsonneault and Kraemer (1989), Sambamurthy et al. (1993), and Straus (1997) used communication medium or technology as an input into the group process. Sambamurthy et al. (1993) and Nunamaker et al. (1991) included group characteristics as an input into the group process. Finally, context remains an important factor in a conceptual framework; context guides the study of linkage and exchange processes, especially in the area of health where linkage and exchange processes can develop differently within a particular policy domain. These four input variables (group characteristics, task, technology, and context) are found in other GDSS literature, such as Nunamaker et al. (1991) and Pinsonneault and Kraemer (1989). In these studies, another input, group

culture, becomes part of the conceptual framework. A rationale that justifies its inclusion into the conceptual framework is offered in the latter section. Table 1 provides a summary of the conceptual models discussed in the literature review.

**Table 1. ICT Literature Review Summary of Group Inputs, Processes, and Outcomes**

Inputs	Processes	Outcomes
<b>Numamaker et al. (1991)</b>		
Task	More Information	Effectiveness
Context	Synergy	Efficiency
Technology	Learning	Satisfaction
Group Characteristics	More Objective Evaluation	Outcome Quality
	Negative Affect on Meeting Outcomes	Confidence with Outcome
	Coordination Problems	
	Information Overload	
	Socializing	
	Free Riding	
	Failure to Remember	
<b>Pinsonneault and Kramer (1989)</b>		
Personal Factors	a) Decisional Characteristics	a) Group Process
Situational Factors	Depth of Analysis	Satisfaction
Group Structure	Participation	Willingness to work in a group in the future
Technological Support	Consensus Reaching	b) Characteristics of the Decision
Task Characteristics	Time to Reach a Decision	Cost
	b) Communication Characteristics	
	Clarification Efforts	Ease
	Efficiency of Communication	Commitment of Group Members
	Non-Verbal Communication	c) Attitude of group members toward the decision
	Task Oriented Communication	Acceptance
	c) Inter-Personal Characteristics	
	Co-operation	Comprehension
	Domination of a few members	Satisfaction
		Confidence
d) Structure Imposed by Technology		
<b>Sambamurthy et al. (1993)</b>		
Tasks	Task Focus	Decision Quality
Group Characteristics	Influence Processes	Consensus Change
Technology	Depth of Analysis in Discussions	Confidence with Outcome
Communication Structures	Structure of Work Process	Perceived Quality
	Performance of Communication Requirements	Satisfaction with Decision Process
<b>Straus (1997)</b>		
Communication Medium	Total Task Communication	Cohesiveness
	Non-Task Communication	Satisfaction
	Task Focus	Productivity
	Supportive Communication	
	Disagreement	
	Personal Attacks	
	Distribution of Participation	

After identifying the major inputs influencing technology-enabled linkage and exchange, the literature review will now highlight the specific group processes relevant to linkage and exchange.

## ***2.5 Defining Linkage and Exchange, Knowledge Exchange, Knowledge Transfer, and Knowledge Translation***

It is important to define the difference between key concepts, such as linkage and exchange, knowledge exchange, knowledge transfer, and knowledge translation, because there is a hierarchy among these terms—beginning with knowledge transfer and continuing to knowledge exchange and to knowledge translation. Knowledge transfer refers to a “conveyance of knowledge from one place, person, ownership, etc. to another. It involves two or more parties and there has to be a source and a destination” (Syed-Ikhsan & Rowland, 2004). Knowledge transfer focuses on the sharing of ideas and research results, usually in one direction through a process that involves extracting key messages from academic literature and communicating them to decision-making groups in plain and easy-to-read language (CHSRF, 2008). CHSRF (2002) defines knowledge exchange as collaborative problem solving between researchers and decision-makers that happens through linkage and exchange. Linkage and exchange are processes embedded within knowledge exchange where researchers and decision-makers “are engaged in ongoing interaction, collaboration, and exchange of ideas” (CHSRF, 2008 ). In regard to knowledge translation, CIHR (2002) defines it as:

The exchange, synthesis and ethically-sound application of knowledge—within a complex system of interactions among researchers and users [e.g., policy decision-makers]— to accelerate the capture of the benefits of research for Canadians through improved health, more effective services and products, and a strengthened health care system. (CIHR, 2002)

Knowledge translation, therefore, encompasses and includes processes of knowledge

transfer and knowledge exchange as well as linkage and exchange.

In addition to these definitions, other researchers have proposed various models that provide explanations for use and non-use of research knowledge in the linkage and exchange process. For example, the two-communities model, also known as the interaction model, assumes that the amount of interaction (i.e., linkage and exchange) between researchers and decision-makers is a predictor of use or non-use of research knowledge by decision-makers (Rich, 1997). This perspective on linkage and exchange assumes that several barriers exist between the research world and decision-making world. Only through increased communication linkages and information exchanges between decision-makers and researchers can research become more relevant and useful to the decision-making process. Studies have shown that such research partnerships can successfully support the implementation of effective interventions that are both of scientific and practical value (Cameron, Brown, & Best, 1996). Hence, the challenge is to close the cultural gap by creating linkages and exchanges between the two cultures where both decision-makers and researchers are involved in the research process (CWHPIN, 2000).

The two-communities model explains why barriers between decision-makers and researchers exist. For example, Fuhrman (1994) suggests that researchers and decision-makers work on different timelines, use different languages, and respond differently to incentives. Leung (1992) claims that a sense of distrust and antagonism permeates interactions between the two-communities.

Rich (1991), however, provides a more comprehensive explanation of the barriers to linkage and exchange within policy decision-making. He classifies the two-

communities barriers in considerable detail: 1) a general distrust and sense of antagonism between the two groups; 2) different reward systems (e.g., researchers are rewarded through publication and managers are rewarded by concrete policy results); 3) different communication styles (e.g., researchers use terms that amount to jargon); 4) different perspectives on time (e.g., decision-makers require information immediately, while it may take years for researchers to provide this information); 5) different perspectives on research relevance (e.g., academic publications in their original form are not relevant to decision-making needs).

As previously noted, linkage and exchange researchers believe that increasing the interactions between decision-makers and researchers will lead to fewer barriers and an increased use of research results in the decision-making process (Huberman, 1990). These interactions can occur through a) informal contacts with decision-makers and researchers; b) researcher involvement in research, committees, seminars, and workshops organized by government agencies; c) reports to government agencies (Landry, Lamara, & Amari, 2001); and d) the involvement of knowledge brokers to facilitate the knowledge translation process (Huberman, 1990).

However, once a relationship between decision-makers and researchers has been established, maintaining such a relationship can be difficult. For instance, value or process conflict between the two groups may impede the relationship (Amabile et al., 2001). To reduce the effect of such problems, researchers have focused their attention on finding ways to build trust through: frequent e-mail and face-to-face interactions; group sense making sessions; conflict resolution procedures; and procedural restructuring (Rynes, Barunek, & Daft, 2001).

Even with positive working relationships, other external factors may cause the linkage and exchange process to fail. For example, research studies demonstrate that the linkage and exchange process tends to move slowly even when relationships between decision-makers and researchers are positive (Rynes, Barunek, & Daft, 2001). A slow process can lead decision-makers to lose interest in the research process.

Nonetheless, the two-communities model has been widely used to explain how the linkage and exchange process can be effectively implemented with researcher and decision-maker groups (Oh & Rich, 1996). Studies in the healthcare domain continue to use the two-communities model to explain the failure or success of decision-maker and researcher interactions, even though at times the two-communities model is not explicitly defined as the model used within a study. For example, in their paper on identifying recent changes in drug cost-containment policies, Soumerai et al. (1997) interviewed participants from United States Medicaid programs. The authors examined some of the internal and external factors that influenced policy change within Medicaid. Soumerai et al. found that policies that were influenced by research evidence were a direct result of collaboration between researchers and decision-makers. One of the recommendations made by the authors was for decision-makers and researchers to maintain long-term relationships so that research would be more likely to be used by decision-makers.

Similarly, a study funded by the Milbank Memorial Fund (2001) on linkage and exchange activities of health policy programs within six countries discusses the importance of maintaining a high level of social interactions between decision-makers and researchers. The study concludes with specific recommendations:

- 1) Mutual understanding between both groups requires a conscious effort in

which both groups make the effort to understand each other's culture.

- 2) Policymakers need to respect the knowledge, competency, and needs of the researcher.
- 3) The linkage and exchange process builds on previous positive experiences, where appropriate expectations and definitions of success are clearly defined.
- 4) The linkage and exchange process is more likely to be enhanced if decision-makers and researchers continue to work together to evaluate effects of policy.
- 5) Decision-makers and researchers must acknowledge that it takes years to build trust and that collaboration should be long-term whenever possible.

The process of information exchange, although relevant to the two-communities perspective, is even more relevant to the dissemination model. The dissemination model describes the information exchange process that transpires between decision-makers and researchers. This model assumes that a step should be added to the research process that is not described in the two-communities model. In this extra step, researchers identify knowledge relevant to decision-makers and make it accessible to them (Landry, Lamara, & Amari, 2001) either through direct mailing, workshops, or conferences (Lomas, 1993). The goal of these methods is to become aware of and influence the policy decision-making process (Lomas, 1993). However, researchers have challenged the assumption that dissemination efforts by themselves will increase linkage and exchange within the decision-making process. Apparently, decision-making is too complex for research evidence alone to create changes in the decision-making process (Landry, Lamara, & Amari, 2001).

Sechrest, Backer and Rogers (1994) argue that a distinction should be made

between dissemination and effective dissemination. Effective dissemination requires: 1) using effective communication methods in reports; 2) making information relevant to decision-making needs; and 3) using graphics, colour, and humour in the dissemination process (Landry, Lamara, & Amari, 2001). Effective dissemination activities include: 1) preparing and conducting meetings to plan the scope of projects with users; 2) scheduling meetings to discuss progress of preliminary results with users (Landry, Lamara, & Amari, 2001); 3) deciding on what information should be transferred; 4) specifying a decision-making audience; 5) choosing a credible knowledge broker; 6) specifying a strategy for dissemination; and 7) evaluating the effects of the dissemination process (Lavis et al. 2003).

Although not within the scope of this study, it is important to assess evidence and its use in the linkage and exchange process. For instance, within the healthcare field, health care professionals, agencies, and medical organizations have embraced clinical practice guidelines because their use leads to improved quality of care and improved cost-effectiveness (Weyden, 2002). However, recently the Australian COX-2 Inhibitor working group found a conflict of interest within the creation of guidelines because many of those involved in the production of the clinical practice guidelines also had professional connections with the pharmaceutical industry. These connections were considered to have biased the guidelines in favour of the pharmaceutical companies (Weyden, 2002). Although outside the scope of this study, the researcher might wish to raise other questions regarding decisions concerning evidence.

In summary, the primary focus of the dissemination model is on information exchange. This is a complex process involving various actors (decision-makers,

researchers, and knowledge brokers), dissemination activities, and dissemination efforts. Therefore, the information exchange process is another group process of interest in the study because of its importance to the linkage and exchange process. The two-communities and the dissemination perspectives on linkage and exchange involve researcher and decision-maker interaction, information exchange, and the use of a knowledge broker to facilitate the group linkage and exchange process. Linkage and exchange processes are composed of sub-processes, such as the social interaction process, the knowledge brokering process, and the information exchange process. These are the linkage and exchange processes that are included in the initial conceptual framework. Furthermore, because differences between decision-making and researcher cultures can affect the linkage and exchange process as described by the two-communities model, group culture will be included as an input in the conceptual framework.

### ***2.6 Effects of Technology on Linkage and Exchange Processes***

The description of the relevant linkage and exchange processes should include discussion of the potential effects of technology on these processes. Zigurs, Pool, and DeSanctis (1988) suggest that the literature concerning ICT has treated group processes as a “black box” with most studies focusing on group process outcomes. The literature indicates that group processes are more complex phenomena than outcomes and more difficult to measure. For instance, evaluating group consensus results, an outcome variable, is less complicated than studying the consensus process. The former can be determined simply by measuring whether the group achieved consensus or not. The latter, on the other hand, is more complicated because evaluating the process of how the group

achieved consensus may require multiple methods. Both qualitative and quantitative methods may be required in analysis of group discussions and in administration of survey questions regarding the consensus process. Burke, Aytes, and Chidambaram (2001) study the effects of technology on group processes, including cohesion, satisfaction, structure, communication effectiveness, and leadership. The authors did not analyze the processes of achieving cohesion, satisfaction, or leadership, but rather evaluated them as group process outcomes, measuring them at different times.

The group processes discussed in the thesis relate to linkage and exchange group processes that have been identified in the literature, namely, social interaction, information exchange, and knowledge brokering (Rich, 1991; Huberman, 1990; CHSRF, 2002; CIHR, 2002; Landry, Lamara, & Amari, 2001). Knowledge brokering is similar to the concept of facilitator in the ICT literature. A description of the similarities and differences between a knowledge broker and a facilitator will be provided in a later section of the literature review.

### ***2.6.1 Effects of Technology on Social Interactions***

Of the researchers examining the effects of ICT on group processes, Zigurs, Poole, and DeSanctis (1988) were among the first to analyze group social interaction processes within GDSS literature. In general, the group interaction process within GDSS supported groups has been studied from the point of view of how technology influences behaviour, which means that these studies focused on how group members interacted with each other and consciously or unconsciously influenced one another in the performance of group related decision-making tasks (Huang & Wei, 2000).

In a laboratory study, Zigurs, Poole, and DeSanctis (1988) specifically examined

group influence behaviour and how members using different communication media (face-to-face and GDSS) influenced each other when working on group tasks. The authors divided influence behaviour into five categories: 1) initiation behaviour (which concerns initiating agendas); 2) goal-oriented behaviour (which concerns group goals); 3) integrative behaviour (which concerns the summary and integration of group contributions); 4) implementation behaviour (which concerns action leading to task completion); and 5) process behaviour (which concerns procedural movement of the group). These categories represented influence behaviour in group interaction processes and the use of influence among members in agenda setting, discussing group goals, summarizing opinion, attempting to implement action, and evaluating group processes generally. The subjects in the study consisted of undergraduate students working in GDSS and non-GDSS supported groups. The study's major findings showed no significant differences in influence behaviour between computer and non-computer supported groups. However, the authors learned that GDSS groups used more initiation influence statements (e.g., acting on an agenda item) and process type influence statements (e.g., providing direction to each other). The authors found another difference: GDSS groups used fewer goal oriented influence statements and integrative influence statements (i.e., summarizing and integrating group member discussions) than did face-to-face groups.

Building on the work of Zigurs, Poole, and DeSanctis (1988), Huang and Wei (2000) studied the effects of GDSS support and task type on social interactions. They designed a conceptual model derived from McGrath's TIP theory, social psychology, and GDSS literature. Like Zigurs, Poole, and DeSanctis (1988), Huang and Wei (2000)

studied group social interactions from a behaviour perspective. The participants in the study were undergraduate students working in GDSS or non-GDSS supported groups and were evaluated in a laboratory type environment. The authors examined two types of group interaction processes: informational influence (accepting information from other members as reality) and normative influences (desiring to conform to the expectations of other group members). The authors found that GDSS support affected group interaction processes by increasing information influence and decreasing normative influence. The authors also found that GDSS groups were less satisfied with the group social interaction process.

In a laboratory study, Siegel et al. (1986) examined the effects of ICT on social interactions, including communication efficiency, participation, interpersonal behaviour, and group choice. The investigators asked group members to reach consensus on career choice problems. The groups communicated either face-to-face or through an ICT medium. Research results demonstrated that when groups communicated using technology, group members made fewer remarks than in face-to-face groups, and it took them longer to reach decisions. Participation was higher in technology-supported groups, though participants used more inflammatory remarks during interpersonal interactions.

Straus (1997) examined the consequences of face-to-face and GDSS on group social interactions. The results of her meta-analysis demonstrated that groups using technology for communication had less personal communication; were more task focused; disagreed more; and were more participative than face-to-face groups. Additionally, technology-enabled groups had lower cohesiveness than did face-to-face groups.

In a field study, Eveland and Bikson (1989) examined the effects of technology on group social interactions. The field experiment created two task forces, one composed of retired employees and the other of employees working but eligible to retire. Both groups were given the same task of preparing company reports on retirement planning issues and were randomly assigned to different interventions. The first group had regular office support, and the other had the same support as the first, with the addition of networked computers, e-mail, and other office software. Investigators interviewed members of the groups 4 times during the year and collected e-mail communications. The authors found that groups using technology developed different social interactions than the group without technology. The technology-supported group took advantage of technology to participate and developed a more fluctuating pattern of leadership, one largely dominated by retirees. The other group had a more consistent type of leadership within the group. Other findings relating to the influence of ICT on social interaction included a higher degree of communication in the technology-supported group with a lessened feeling of isolation plus higher involvement in group work and higher satisfaction in work-related outcomes.

Overall, ICT seems to dampen social interaction processes (Huang & Wei, 2000). Group members using ICT were found: to be less goal oriented; to use less integrative and influence statements than were the face-to-face groups (Zigurs, Poole, & DeSanctis, 1988); to use more inflammatory remarks; to disagree more (Straus, 1997) than face-to-face groups (Siegel et al. 1986); to have less personal communication between group members (Straus, 1997); and to have less stable leadership (Eveland & Bikson, 1989). However, ICT enabled groups were more participatory (Eveland & Bikson, 1989; Siegel

et al., 1986; Straus, 1997); members were less likely to conform to the expectations of other group members (Huang & Wei, 2000); members were more satisfied with work-related outcomes (Eveland & Bikson, 1989); and members were more task focused (Straus, 1997).

Because of the many social interaction processes researchers have observed, it is worthwhile to explore how groups develop social interaction norms within a technology-enabled environment. The ICT literature tends to view social interaction norms within a group as a way to bring a form of governance to online environments where group members learn about what is or is not socially acceptable within a group. Group social interaction norms are crucial for the smooth operation of groups using ICT to collaborate at a distance (Danis & Lee, 2005). In face-to-face settings, people are more aware of other group member's behaviour, and social interaction norms tend to develop implicitly over time, primarily through group observation (Danis & Lee, 2005). However, when working at a distance via various forms of ICT, social interaction norms are more difficult to develop because group members are not able to observe other group members. Therefore, when introducing ICT to communicate at a distance, group members will begin to form new social interaction norms to facilitate group interactions (Mark, 2002). These agreed-upon rules of interaction help develop group process gains and increase the chances of positive group work (Mark, 2002). As Meyrowitz (1985) notes, "The introduction and widespread use of a new medium of communication may restructure a broad range of situations and require new sets of social performances" (p. 39).

In the early 1990s, the important concept of genre entered ICT literature. First introduced by Yates and Orlikowski (1992), genre provided a way to identify how

various forms of communication (e.g., memo, proposal, expense form, and resumes) can affect group norms, behaviour, and work structures. Yates, Orlikowski, and Rennecker (1997) suggest that group members use genres for specific communication purposes. Their use has a particular function and meaning associated with various work practices and group interaction norms (Yates, Orlikowski, & Rennecker, 1997). The genres not only shape group communication, but they also influence how the group adopts various social interaction norms within the group. When an established genre is changed and becomes widely shared within a group or an organization, new genres, or a variant of the original, may emerge. Changes in genre may occur due to the introduction of a new communication medium (Yates, Orlikowski, & Rennecker, 1997).

For example, a resume is a document used by employers to make decisions about hiring an individual for a particular job. As a genre, the resume has a particular form in which it is communicated (fax, e-mail, online) and a specific linguistic style to which it adheres (Yates, Orlikowski, & Rennecker, 1997). If the established communication method were to change exclusively to online from fax or e-mail, new social interaction norms would emerge due to the introduction of a single medium for resume submissions. New norms would require job seekers to apply through a website where they would enter information in fields predetermined by the employer. Potential job seekers would be required to create a login name and password to apply and edit their applications. This new system for submitting resumes would create new social interaction norms for job seekers.

Yates, Orlikowski, and Rennecker (1997) used the concept of genre to examine the use of an electronic document management system that facilitated collaboration

among organizational group members. Studying three teams within an organization for a seven-month period, the investigators found that social interaction norms developed differently in different groups. These differences were attributed to group size, task, and orientation towards the new technologies. Group members replicated similar social interaction norms within the new genre system and made innovations in creating new norms, such as highlighting text in documents, embedding documents created in other media, and implementing faster turnaround in group-group discussions.

In another instance, Orlikowski and Yates (1994) studied the e-mail communication of knowledge workers collaborating on a multi-year project. The participants were computer language designers, who developed various programming languages. The authors analyzed over 2000 transcripts of archived e-mails in their analysis, finding that when a group forms, members come to an agreement, whether implicitly or explicitly, on which genres and communication media to use. When group members incorporate these norms within the group, they produce social interaction norms that define how the group works together. Over time, the group reinforces the pattern of social interaction norms, and they define how group members work with each other. These groups continue to change and evolve as circumstances change within the group. Group members will need to respond to time pressures, task demands, new projects, and new technologies, and this will continue to change group social interaction norms.

Other studies, not based on genres, have described the effects of technology on social interaction norms within groups. In a field case study, Mark (2002) presents an analysis of why groups fail to develop social interaction norms in technology-enabled distant environments. In his study of the implementation of an electronic document

management system that would facilitate co-operation between federal agencies in the German cities of Bonn and Berlin, Mark (2002) found that it took two years for group members to develop social interaction norms to facilitate group interaction via the document management system. The author noted that the failure to develop social interaction norms within the group was a result of several factors: group member inability to observe each other; lack of mechanisms to monitor group adherence to norms; and the inability to apply pressure on group members to conform to group social interaction norms. The author also notes that the violation of social interaction norms may be attributed to such factors as self-interest in following individual work processes as opposed to the group work process.

In another field case study, Ackerman et al. (1997) looked at social interaction norms of groups using teleconferencing technologies to support group communication. Using high audio quality for communication, users had the option of listening and speaking during group discussions. The group consisted of nine members working on engineering related projects. The authors described the group as cohesive prior to the implementation of the teleconferencing system because the members knew each other well and had spent time working with each other. The group members developed social interaction norms for dealing with background noise, for knowing when someone was present and listening, and for limiting violations of personal privacy. For instance, to clarify when someone was present and listening, group members developed social interaction norms for signing off and on to the group communication system and for sharing private information. To sign off, group members were required to inform other group members of their action, and to sign on, the group members would notify and greet

each other. Since these social interaction norms were easy to evade, sanctions were put in place to stop unwanted behaviour. Other norms also developed within the group. For example, the authors found that it was more difficult for group members to avoid participating in group discussions because they could not make themselves appear busy with another task or avoid eye contact in an audio only communication mode. However, group members did find other ways to avoid participation, such as reporting equipment failure. Finally, disclosure of private information was more difficult to control because group members, while speaking, were unable to hear other members' verbal reactions to information disclosed by the speaker.

To summarize, technology can influence how social interaction norms develop within a group. In face-to-face sessions, social interaction norms develop implicitly over time, but are more difficult to develop in technology-enabled groups because group members are not able to observe other group members' behaviour (Danis & Lee, 2005). When group members incorporate social interaction norms within the group, implicitly or explicitly, they produce a form of social interaction norms that define how the group works together. Over time, group members define and reinforce the pattern of social interaction norms within the group. These groups will continue to change and evolve as circumstances change (Orlikowski & Yates, 1994). Mark (2002) notes that the failure to develop social interaction norms within the group may be a result of several factors that relate to group member inability to observe one another; lack of mechanisms to monitor how group members adhere to the norms; and the inability to apply pressure on group members to conform to norms. Overall, social interaction norms within groups using various technologies develop differently depending on group size, task, and orientation of

the group and group members (Yates, Orlikowski, & Rennecker, 1997).

### ***2.6.2 Effects of Technology on Information Exchange***

Several studies in the ICT literature and particularly in GDSS literature have focused on information exchange. In general, the literature suggests that ICT, especially GDSS, increases information exchange within groups. In a laboratory setting, Dennis (1996) conducted a study in which he not only evaluated information exchanges between GDSS and face-to-face groups, but also went a step further and evaluated information use. University students in GDSS-supported and face-to-face groups were given the task of evaluating student profiles and recommending them for university admission. The results demonstrated that both GDSS and face-to-face groups did not share much of the information available to them because they had poor information exchange and, as a result, made inadequate decisions regarding admission recommendations. This finding contradicts previous GDSS research, which states that GDSS systems produce more information exchange between group members than occurs in non-GDSS groups (Dennis, 1996). Dennis provided an explanation for this result by showing that the previous literature included larger groups than the six-member groups used in the author's study. Furthermore, because information exchange in the GDSS was anonymous, GDSS groups were less likely to use information in the decision-making process. The author suggests that groups may view anonymous information as less credible and, therefore, be less likely to use it.

GDSS support has also been used to facilitate information exchange and decision-making between policy makers. Van den Herik and de Vreede (1997) carried out a field study on the use of GDSS to support policy-making decisions by the Dutch Ministry of

Housing. Although the study did not focus on information exchange *per se*, it is reviewed here since it reveals some of the effects of technology on policy information exchange. With respect to information exchange, the authors found that voting features provided by the GDSS did not promote consensus when policy makers had divergent opinions. However, the voting feature did help policy makers share information during a period of mutual debating positions.

Other technologies have also promoted communication linkages and information exchanges between groups. Lau and Hayward (2000) used various technologies in a virtual network and found that technology helped build relationships and information exchange between healthcare managers and professionals. The investigators recruited 25 health professionals from 17 different regions to participate in a seven-week training program designed to develop skills in health policy, management, economics, research methods, data analysis, and computer technology. Subjects had access to various technologies (web-conferencing, e-mail, newsgroups, document management, and internet access) that enabled them to disseminate information and to communicate and collaborate with one another. After analyzing their research results, the authors provided ten recommendations for building successful virtual networks. Building relationships through support and including external members in such networks can lead to higher information exchange, greater exchange of ideas, better problem solving, and counselling support in decision-making groups. The authors noted that the technology was especially helpful for groups working in remote communities, since it helped to foster communication linkages and information exchanges with members in other areas.

In a study similar to that of Lau and Hayward (2000), Finnegan and O'Mahony

(1996) used various technologies to support information exchanges for three group processes: communication, co-ordination, and collaboration. The authors studied these group processes at various stages of the decision-making process; their results showed that technologies (conference calls, e-mail, video conferencing, electronic black boards, and discussion forums) primarily facilitated communication for information exchange and that use of technology in other decision-making processes was virtually non-existent. The authors also found that ICT in general helped to facilitate information exchange for solving group problems, but when it came to discussing policy alternatives, organizational decision-makers preferred face-to-face contact.

Studies have shown that simpler technologies, such as teleconferencing and e-mail, promote information exchanges between group members. In a laboratory setting, Graetz et al. (1998) examined how groups share information for decision-making in both technology-enabled and face-to-face groups. The subjects were university students assigned to either a face-to-face, teleconferencing, or electronic chat group (a technology that allows groups to communicate synchronously through text). Their task was to use information to rank proposals based on a ten-point rating criteria. The results showed that using electronic chat rooms required a greater mental effort by group members ranking proposals; further, electronic chat group members had a limited ability to co-ordinate and verify information shared between them. The study also indicated that teleconferencing was superior to face-to-face and electronic chat groups for information exchange. The authors reported more openness, homogeneity, and accuracy of information exchanges during teleconferencing than with either face-to-face or electronic chat groups. The authors suggested that teleconferencing may replace face-to-face for information

exchange in distributed groups.

Working in a field setting, Koch and Davidson (2003) present evidence that simple communication technologies, such as e-mail, can positively influence group information exchange. In their study, the authors focused on the use of information for organizational process improvement, including product design, course teaching, and software support. They report that e-mail can have a positive effect on information exchange when used to support process improvement activities. The results of the study indicated that simple asynchronous media, including e-mail, can support information exchange in process improvement.

Overall, technology can improve information exchange between large groups of six or more (Dennis, 1996), but when group members are unable to assess the credibility of information, they are not likely to use the information shared (Dennis 1996; Graetz et al., 1999). According to Lau and Hayward (2000), the use of ICT can improve the information exchange process. Furthermore, information exchange is dependent on the group task and the technology used during the information exchange process. For example, Koch and Davidson (2003) found that e-mail could improve information exchange in groups working on process improvement, while Graetz et al. (1998) demonstrated that groups were more able to share information when teleconferencing than when participating in electronic chat groups. Finnegan and O'Mahony (1996) observed that technology generally helped facilitate information exchange for solving group problems, but with regard to discussing policy alternatives, organizational decision-makers preferred face-to-face meetings.

### ***2.6.3 Effects of Technology on the Facilitation Process and Effects of Facilitation Process on Group Processes***

The facilitator's role has mainly been studied from two perspectives: that of effects of facilitators on group processes and that of effects of technology on the facilitation process. Generally, the role of the facilitator has been an active one within the group process. McFadzean, Somersall, and Coker (1999) described three phases of group meetings in which the facilitator plays a role in facilitating the group process: pre-session, session, and post-session phases. The authors proposed six variables the facilitator should consider when facilitating group processes: goal congruence, process congruence, accessing information, communication, deliberation, and distractions. Using two case studies in a field setting, the researchers found that a lack of goal congruence (group agreement on meeting objective) and a lack of process congruence (group agreement on the meeting process) during the pre-planning stage of the group meeting had devastating consequences for group meetings. The results of their study also indicated that accessing and communicating information and deliberating between group members are important facilitation processes that deserve planning during the pre-session, session, and post-session phases of group meetings.

Knowledge brokering is a very active function that focuses on the facilitation of interactions between decision-makers and researchers. Essentially, knowledge brokering is a function of facilitation because its purpose is to bring people together; to help researchers and decision-makers maintain relationships; and to improve communication and collaboration during the research process (CHSRF, 2004). The function of a knowledge broker includes a) bringing people together to exchange information; b)

helping groups communicate and understand each other's needs and abilities; and c) guiding decision-makers through sources of research by synthesizing and summarizing research for them (CHSRF, 2004). In practice, facilitation and knowledge brokering are similar functions though often described in different domains. They both involve the facilitation of communication and active involvement in group discussions and group processes. However, knowledge brokers are different from facilitators in that they focus on building decision-maker and researcher relationships while facilitators are focused on managing the group communication processes irrespective of group composition.

Within the GDSS literature the facilitator has traditionally been an individual from outside the group, trained in the skills of managing group interactions while remaining neutral during group discussions (Anson, Bostrom, & Wayne, 1995). Essentially, the facilitator's role within a GDSS environment is passive and contained in providing either group process support or group technical support (Dickson, Partridge, & Robinson, 1993). The functions of a process facilitator include listening, clarifying, and integrating information; creating an open and positive environment; directing and managing the meeting; and building rapport and relationships among group members (Clawson, Bostrom, & Anson, 1993). The functionalities of a technical facilitator include understanding the technologies and their capabilities; creating comfort with the technology; and selecting and preparing the technology for use by the group (Clawson, Bostrom, & Anson, 1993). These facilitation processes may be constrained not only by the type of technology used within the group, but also by group member attitudes and group tasks (Niederman, Beise, & Beranek 1996).

With regard to the influence of facilitation on group processes, a trained facilitator

can bring positive outcomes to group processes. Anson, Bostrom, and Wayne (1995) studied the effects of GDSS support and those of a facilitator on group performance, on perceptions of group cohesion, and on group interaction processes. They integrated propositions of Adaptive Structuration Theory (AST) into their theoretical framework to develop research hypotheses for treatment results. Their research results showed that groups provided with more structure via facilitation, though without GDSS support, demonstrated greater cohesion and improved group processes than GDSS-supported groups without process facilitator support. GDSS combined with facilitation support tended to have the most significant outcome on group cohesion and group interaction processes. The authors made the following recommendations based on their findings: facilitation is a critical factor for improving GDSS effectiveness; higher quality facilitation improves the meeting process; and training and experience is important to building high quality facilitation skills. Furthermore, the facilitator can influence group processes at several levels: 1) at the level of group member behaviour and attitudes; 2) at the level of the group agenda and meeting structure; 3) at the level of the definition of and focus on group tasks; and 4) at the level of selection of technology (Niederman, Beise, & Beranek, 1996).

The literature shows that facilitation and knowledge brokering processes in non-technology-enabled environments are more active, whereas in a technology-enabled environment facilitation becomes more passive, focusing on technological and process facilitation support. This suggests that the facilitator role can have a positive effect in promoting group processes (Anson, Bostrom, & Wayne, 1995). The facilitator can also influence group processes in several areas: 1) that of group member behaviours and

attitudes; 2) that of the group agenda and structure of the meeting; 3) that of the definition of and focus on group task; and 4) that of selection of technology (Niederman, Beise & Beraneck, 1996). For the remainder of this study, the thesis refers to the group facilitator as a process facilitator and the knowledge broker as a dissemination facilitator.

### ***2.7 Summary of ICT Transformation of Social Interaction, Information Exchange, and Facilitation Group Processes***

This literature review has highlighted social interactions, information exchange, and facilitation (knowledge brokering)—three important group processes relevant to technology-enabled linkage and exchange. The findings here show that ICT can dampen social interactions among group members and increase information exchange in large groups. Groups using technology are in need of effective facilitators to improve group process interactions and outcomes. Further, while the literature review focused primarily on GDSS technology, it also included studies of groups using the technologies of e-mail, web-conferencing, teleconferencing, discussion forums, document management, and the Internet. These studies report different levels of success concerning the effects of ICT on group communication linkages and information exchange processes. More importantly, the success of group processes can vary depending on group size, task, context, and technology (Dennis, Nunamaker, & Vogel, 1991).

Much of the ICT literature on group processes arises from a rationalistic, outcome-based perspective. However, little research has looked at the consequences of ICT for group processes from a process perspective. Our understanding of group linkage and exchange processes would benefit from a process perspective (i.e., focusing on the in-depth process), as distinct from an outcome perspective. The conceptual framework

included in the study builds on linkage, exchange, and ICT literature and provides a framework to evaluate technology-enabled linkage and exchange processes.

Finally, the literature review discussed field, experimental, and conceptual papers. In a review comparing laboratory and field research studies on groups using GDSS, Dennis, Nunamaker, and Vogel (1991) found inconsistencies in the research results that explained the effectiveness of GDSS on group processes. However, the authors suggest that the difference in results are not due to study locale, that is, to field or laboratory settings, but, rather, to the organizational contexts, group characteristics, technology used, and task complexity. Differences in these variables explain the differences in results and make it more difficult to generalize research findings to other times, groups, places, or settings (see Table 2).

**Table 2. Various Differences in Laboratory and Field Experiments**

Laboratory Experiments	Field Studies
Group Size	
Study larger groups	Study smaller groups
Task	
Use pre-existing tasks with which the subjects are familiar	Track task characteristics
Incentives	
Give incentives to motivate subjects	Understand organizational incentives
Technology	
Facilitators are technical or passive in the meeting process	Facilitators take a more active role in group processes

Source: Dennis, Nunamaker, and Vogel, 1991

### ***2.8 Summary of the Literature***

The literature review included discussions about the traditional research process and how it compares to the modified CIHR knowledge translation research process. The literature review also evaluated the role of technology in the research process and found a

dearth of research in the area of decision-maker and researcher linkage and exchange using ICT. To understand how the presence of technology affects groups, the literature review surveyed the ICT literature and identified many group inputs, processes, and outcomes. In the literature on linkage and exchange, the review described significant group linkage and exchange processes, including the information exchange process, the social interaction process, and the facilitation (knowledge brokering) process. The review of the literature on ICT in relation to group processes relevant to linkage and exchange revealed that technology-enabled groups develop various social interaction norms when using ICT and that ICT can help improve the information exchange process. Concerning facilitation, the literature indicated that ICT limits the participation of the facilitator, yet groups using ICT were found to be in need of effective facilitators to improve group process interactions and outcomes.

As researchers and decision-makers increasingly engage in collaborative research for drug policy decision-making, new linkage and exchange tools, such as ICT, are needed to facilitate this process. However, no research studies, to the best of this researcher's knowledge, have examined this phenomenon of technology-enabled linkage and exchange processes in healthcare groups and especially within drug policy. Furthermore, of those studies investigating group processes relevant to linkage and exchange within the ICT literature, most have focused on group process outcomes. No conceptual models reviewed in the literature focus on the use of technology-enabled linkage and exchange in drug policy. A goal of the study is to contribute to both the ICT and linkage and exchange literature in the development and refinement of a conceptual framework useful in the evaluation of linkage and exchange.

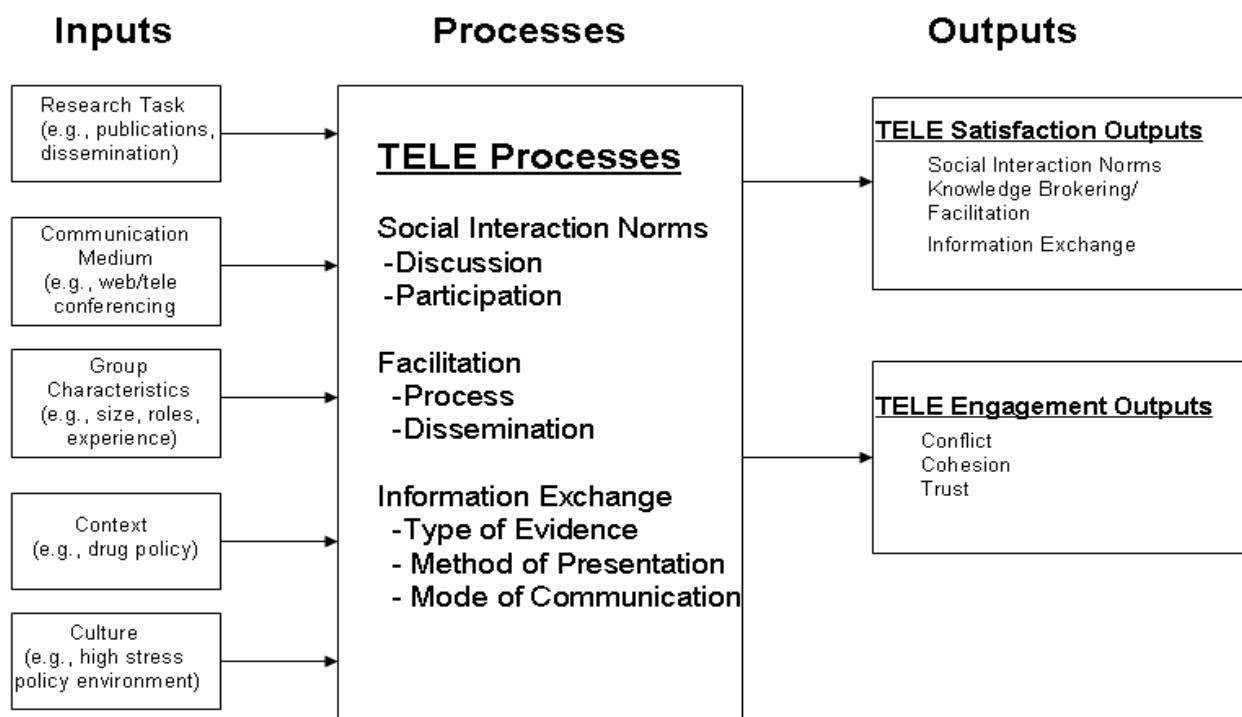
## ***2.9 Introduction to the Conceptual Framework***

According to McGrath (1984), the study of groups requires three sets of variables: those describing inputs into the group; those describing the group process; and those describing group outputs. The proposed technology-enabled linkage and exchange (TELE) conceptual framework builds on the previous ICT conceptual models; however, it is contextually sensitive to the inputs, processes, and outputs relevant to linkage and exchange. The constructs of Nunamaker et al. (1991), Pinsonneault and Kraemer (1989), and Sambamurthy et al. (1993) are generic conceptual models focused on evaluating the influence of technology on group process outcomes. The TELE conceptual framework is focused on evaluating the linkage and exchange process of distant technology-enabled drug policy groups that are influenced by inputs and where end results are outputs.

### ***2.9.1 Creation of the Technology-Enabled Linkage and Exchange Conceptual Framework***

Figure 2, the initial TELE conceptual framework, depicts a sample of some of those variables, categorized into input, process, and output variables. Generally, input variables describe the makeup of the group in terms of the communication medium, the research task, the context, group characteristics, and culture. Process variables are concerned with how the group works together, how members interact with each other. Output variables reflect the end-results of group efforts, such as how well a group performed its task. They are a result of a process and are measured quantitatively to provide evidence that the TELE process took place.

**Figure 2. Technology-Enabled Linkage and Exchange Conceptual Framework.**



Sources: Dennis & Nunamaker, 1984; Nunamaker et al., 1991; Pinsonneault & Kraemer, 1989; Sambamurthy, Poole, & Kelly, 1993; Straus, 1997; Huberman, 1990; Landry, Lamara, & Amari, 2001; Lenfant, 2003; Rich, 1991, 1997; Burke, Aytes, & Chidambaram, 2001; Dennis, 1996; Miranda & Bostrom, 1993.

Generally, research studies investigating the effects of technology on groups have analyzed some combination of input variables and their consequences for group processes and outputs. Certainly, not all researchers would agree with the conceptual framework proposed in Figure 2. Some may see some of the process variables as outputs or some of the outputs variables as processes. Others might place some of the inputs, processes, and outputs in different categories. For example, certain researchers might see the social interaction process as an output variable, while viewing group cohesion and trust as process variables. Furthermore, the framework presented in Figure 2 does not present a comprehensive conceptual framework for evaluating the consequences of technology-enabled linkage and exchange (TELE) on group processes; rather, it places

some of the concepts of interest in a context that provides a basis for further discussion and analysis.

The foundation for the conceptual framework lies in the ICT and linkage and exchange literature. With inputs, group characteristics, research task, context, communication medium, and culture originated in the ICT and linkage and exchange literature (Dennis & Nunamaker, 1984; Nunamaker et al., 1991; Pinsonneault & Kraemer, 1989; Sambamurthy, Poole & Kelly, 1993; Straus, 1997; Rich 1997). Group linkage and exchange group processes, social interaction process, facilitation (knowledge brokering) process, and the information exchange process are also included. The linkage and exchange literature offers a discussion of these processes (Huberman, 1990; Landry, Lamara, & Amari, 2001; Lenfant, 2003; Rich, 1991, 1997).

The output variables included in the conceptual framework fall into two groups: TELE engagement outputs and TELE group process satisfaction outputs. The TELE group process outputs originate in the linkage and exchange literature. Linkage and exchange group process outputs included social interaction process, facilitation (knowledge brokering process), and the information exchange process. These processes are derived from the linkage and exchange literature (Huberman, 1990; Landry, Lamara, and Amari, 2001; Lenfant, 2003; Rich, 1991; 1997). With engagement outputs, conflict level, cohesion, and trust are group engagement process outputs of interest to the thesis; these are discussed in the ICT and linkage and exchange literature (Burke, Aytes, and Chidambaram, 2001; Dennis, 1996; Miranda and Bostrom, 1993; Rich, 1991).

### ***2.9.2 Explaining the Technology-Enabled Linkage and Exchange Conceptual Framework***

Inputs into the framework are research task (based on the CIHR knowledge translation process), communication medium (face-to-face, teleconferencing, or web-conferencing), group characteristics (size, experience, goals, and roles), context (description of linkage and exchange within the policy domain and group type), and culture (describing the groups culture within the particular policy environment). The inputs will affect how the social interaction process, facilitation process, and information exchange process between drug policy groups develop as part of the linkage and exchange process. The inputs and processes and how they shape the linkage and exchange process will lead to different levels of engagement outputs and linkage and exchange outputs. The methods section will describe the operationalization of the TELE conceptual framework.

### ***2.10 Chapter Summary***

This chapter has reviewed the literature on linkage and exchange and ICT and introduced a conceptual framework built on both the linkage and exchange and ICT literature. The following chapter provides a detailed description of the research methodology that was utilized in the study of TELE in drug policy groups.

### **Chapter 3: Methods**

The previous chapter outlined current literature on ICT and linkage and exchange and introduced a conceptual framework for studying technology enabled linkage and exchange (TELE). This chapter provides a detailed description of the research methodology that was utilized in the study of TELE in drug policy groups. The approach allowed consideration of the following research questions:

- 1) Does ICT have an influence on linkage and exchange processes in drug policy groups?
- 2) What are the effects of different types of ICT on linkage and exchange processes?
- 3) How should linkage and exchange processes be operationalized in the conceptual framework?

The chapter is organized into several sections that provide a framework within which to describe the research plan. The chapter explains the overall study design and rationale for using case study research, followed by the description of the subjects, materials, and procedures used for data collection and analysis. Finally, the chapter discusses the manner in which the TELE conceptual framework was operationalized within the study.

#### ***3.1 Overall Study Design***

For this research, a case study approach was selected as an appropriate method because it permitted observation of the complex process of TELE. The researcher considered other research methods, such as a randomized control trial or a quasi-experimental design. However, because it would have been difficult to control for research tasks, group characteristics, communication media, and culture while using these

alternative methods, they were ruled out. Action research was also considered. However, because of this researcher's role as an observer, it would have been difficult to apply this methodology to the study. Action research requires the active collaboration between researchers and stakeholders to improve a certain condition or state, in this case, the TELE process. Because the goal of the research was not to improve a certain condition or state, but rather to understand it through observation, action research would not have been an appropriate research methodology to use.

Case study research focuses on "understanding the dynamics present within single settings" (Eisenhardt, 1989). Case study research collection methods include archival research, interviews, questionnaires, and observations. Yin (2003) and Stake (1995) note that case study is a method that is all-encompassing and includes design, data collection, and analysis strategies. They are a preferred strategy if an investigator is interested in knowing how something happened and why it may have happened (O'Sullivan & Russel, 1999) and are appropriate when the phenomenon is not easily separated from the context under study (Yin, 2003). It is important to note that case studies are not to be confused with ethnographic studies because, unlike ethnographic studies, case studies can use both quantitative and qualitative data and do not always include direct and detailed observations as sources of evidence (Yin, 2003).

Case study research appears in the social sciences, health informatics, knowledge translation, and the ICT literature. A widely accepted research methodology, it serves to describe the real-life context in which an intervention has occurred and demonstrates the details of participant viewpoints through the use of multiple data sources (Stake, 1995; Yin, 2003). The rationale for characterizing this research study as a case study rests on

Yin's (2003) and Stake's (1995) characterization. Yin (2003) notes that case studies are appropriate in "an empirical inquiry [to] investigate a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident." Stakes (1995) notes that: "the first criterion should be to maximize what we can learn given our purposes, which cases are likely to lead us to understandings, to assertions, perhaps even to modifying of generalizations?" The current study of TELE falls within Yin's stated criteria for case study: the study attempts to observe a phenomenon of linkage and exchange processes in a real-life context that has not been extensively researched previously. Therefore, the case study approach is an appropriate method for this research study according to Yin. With regard to Stake's criteria, the study explores and demonstrates how technology can be used for linkage and exchange within drug policy groups. Applying the case study research methods in the thesis will provide a more complete picture of how ICT can affect linkage and exchange processes and will lead to the development of a refined conceptual framework for TELE.

Another rationale for choosing this method lies in the need for a non-participatory approach for studying the complex process of linkage and exchange. With case studies, the researcher is a non-participant observer collecting data and monitoring the group over time without interfering in the drug policy group interactions.

Two strengths of case study research are its flexible method and its emphasis on context (Colorado, 2005). In the study, the case study was found to be flexible because of its emphasis on exploration, rather than verification of predictions, which allowed the researcher to start with very broad questions and then narrow the focus of the study to specific questions. Case study also emphasizes the importance of providing rich

descriptions of the case, which was addressed in the thesis (Colorado, 2005).

Some criticisms of case studies raise the issues of reliability, validity, and generalizability (Colorado, 2005). Qualitative researchers do not use such terms, but instead speak of credibility, dependability, confirmability, and transferability when assessing their research studies; therefore, these criticisms are inappropriate. Nonetheless, the study adopted various strategies to improve reliability, validity, credibility, and dependability. These strategies included: 1) member checking (checking with the subjects about the interpretation of their research findings); 2) description of researcher bias (describing the researcher's biases going into the study); and 3) triangulation of participant views (Creswell, 2003). In addition, case study research has been criticized for not being generalizable to other times, places, or settings. For case studies, generalizations, or transferability of findings, are limited to the case or to cases with similar attributes (Tellis, 1997). However, because the study provides a rich set of descriptions of the research setting and context, readers of the case study are able to determine if the similarities are enough to warrant their implementation within their own socio-cultural milieu. In addition, a neutral stance was maintained during the study, and this improved objectivity or confirmability.

Applying case study research methods in the study is appropriate because such methods provide a more complete picture of how ICT can influence the linkage and exchange process. The findings will lead to the development of a refined conceptual framework on TELE.

At the same time, it is important to note that case study research is not sampling research (Stake, 1995), i.e. the purpose of case study research is not to study one case so

that the researcher can understand other cases. Rather, it is vital to focus on the particular case studied (Stake, 1995). The study considers three different drug policy groups that use ICT to communicate. These groups were included by convenience because it was easy to gain access to them and because they were willing to participate in the study.

### ***3.1.1 Comment on Participant and Non-Participant Observation***

According to Trochim (2005), qualitative researchers can take the role of a participant observer or a non-participant observer within the research process. Participant observation requires the researcher to immerse him- or herself in the participants' setting and become part of the social group, rather than sitting outside as an objective observer (Trochim, 2005). Participant observation is a form of ethnographic study technique that requires interviewing, observing, analyzing text, audio and visual recording, and taking account of non-verbal cues (Searle, 1993). Participant observation requires intensive work on behalf of the researcher to promote acceptance in the participants' cultural setting and with respect to the natural phenomenon of interest (Trochim, 1995). The disadvantages of participant observation include: 1) researcher bias; 2) limited generalizability or transferability; 3) time required to build trust with participants; and 4) too little data, leading to false assumptions (Colorado, 2005). Advantages to participant observation include a deeper understanding of the researched phenomenon through active participation.

The non-participant observer does not immerse him- or herself in the world of the participant, as opposed to the participant observer (Trochim, 2005). Within the study, the researcher observed the drug policy groups and collected data about them, remaining detached from group discussions and processes. The researcher tried to be as unobtrusive

as possible so as not to bias the research observations (Trochim, 2005). Non-participant observation offered advantages: it provided easier access to the drug policy research world and was perceived as less biased than participant observation because the researcher did not participate as a group member. A disadvantage of non-participant observation was that it did not provide a complete understanding of a drug policy group's socio-cultural context and, therefore, may have limited the generalizability or transferability of the results.

### ***3.2 Participants***

#### ***3.2.1 Brief Description of the Education, Research and Decision-Making Task Groups***

The following chapter provides more details concerning group characteristics, where a discussion of inputs, described in the conceptual framework, is made. The methods section of the study also offers a brief description of the groups observed throughout the study.

*Education Task Group.* The education task group consisted of academic detailers who were charged with the task of producing research reviews regarding new drugs to disseminate to physicians. Academic detailing is a process that involves studying the status of how knowledge is used; defining knowledge and its objectives; including practitioners and opinion leaders; and providing support for the implementation of research knowledge (KUSP, 2003). Of the 26 potential participants in the education task group, 20 were included in the study. The six that were excluded were observers and administrative assistants. The 20 participants included in the education task group were researchers, educators, and decision-makers.

*Research Task Group.* The study included two research task groups. The first

research task group was charged with the task of evaluating the British Columbia Fair Pharmacare Income Based Deductible (IBD) drug policy program. Baseline interview data were collected for the research task group; however, the group was dropped because of infrequent meetings. The study replaced the original research task group with a second research task group. This group was charged with the task of evaluating the cost-savings of physician educational interventions. It included researchers and decision-makers working together on the evaluation of Education for Quality Improvement of Patient Care (EQIP) project. Of the 17 potential participants in the group, 14 were included in the study. The three excluded were observers and administrative assistants. The included participants were either researchers or decision-makers.

*Decision-Making Task Group.* Through a Health Canada funded research program, drug policy researchers and decision-makers and their staff met with each other on a monthly basis using synchronous (live teleconferencing) and asynchronous (pre-recorded teleconferencing) communication methods to disseminate research information on the latest drug policy research trends. This group was charged with the task of disseminating research to drug policy decision-makers. Of the 32 potential participants in the decision-making task group, 27 were included. The five excluded were observers and administrative assistants. The 27 participants included in the decision-making task group were researchers and decision-makers and staff from provincial Canadian drug plans.

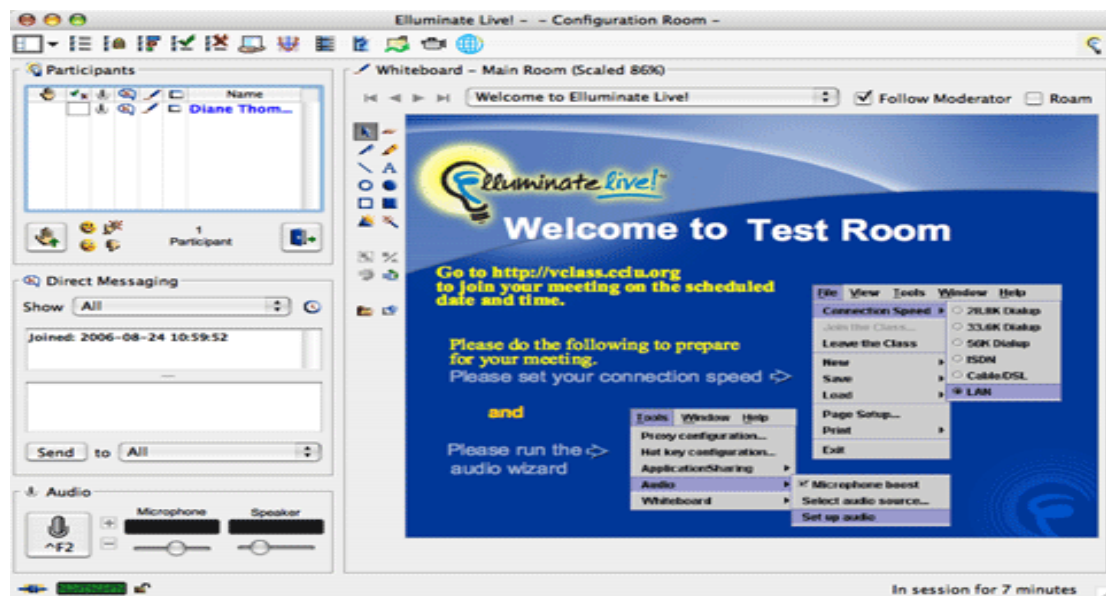
### ***3.2.2 Materials Used in the Different Communication Media***

The web-conferencing technology used in the study was Elluminate Live V-Class edition. The version of the technology employed in the study allowed for half-duplex audio communication that permitted users to speak one at a time. Full-duplex

technologies allow more than one participant to speak at a time, which is a new feature of Elluminate and other major web-conferencing providers, such as Web-Ex. Elluminate allowed users to upload agendas to the whiteboard, share documents via application sharing, use instant text message, vote/poll participants, use emoticons, raise hands, and see participant names. These were the most relevant features used by the groups in the study.

Figure 3 shows a generic screen shot of the Elluminate Live technology. The most visible feature is the participant window (top left). In this window, the participant names are displayed along with emoticons and the hand raising feature. Below this window is the direct text messaging feature, which allowed group members to communicate using text messages. Below the direct messaging window is the half-duplex audio communication function. The group used this function to communicate, using audio. The main screen is the whiteboard page. This allowed group members to share PowerPoint slides and manipulate the slides, using whiteboard tools.

**Figure 3. Elluminate Live Screen Shot.**



The education and research task groups used Elluminate Live V-Class edition to participate in the meetings. Elluminate Live V-Class offered two advantages. First, the University of Victoria School of Health Information Science had made it available to the drug policy groups. Second, at the time of study, Elluminate was a leader in web-conferencing for real-time organizations and had features similar to those found in other major web-conferencing tools (Good, 2004; Market Wire, 2004). To participate, group members needed a computer, microphone, speaker or headphones, and an Internet connection.

For teleconferencing, the education and decision-making task groups used the TELUS audio teleconferencing technology. The technology used audio only communication where multiple participants could speak at a time; there was no video or other media for communication. A participant simply dialed a telephone number, entered a conference code, and responded to a prompt requesting his or her name; a beep sound let other participants know that someone had joined the meeting. To use this technology, group members needed access to e-mail and a telephone. E-mail was necessary to inform the participants about the meeting details (time, numbers to dial, and the agenda). A telephone was required to participate in the meeting.

During face-to-face meetings, group members met in a designated room where the chairs were arranged around a space or a table. The space in the middle of the meeting setup had an image projector connected to a computer. The image projector projected items onto a screen; the agenda and other related meeting documents were projected throughout the meeting. In addition, paper copies of the material presented on the screen were made available to group members. Within the meeting room, there was also a chalk

board and a flip chart; however, these items were not used by the groups included in the study.

### ***3.3 Data Collection Process***

The study took place over two years and involved three drug policy groups that were observed within the same timeframe. Different data were collected for the three drug policy groups. According to Yin (2003), case study research benefits from the use of multiple data sources and perspectives to improve the trustworthiness of the case study. The data were collected in three phases. Phase 1 data included a compilation of baseline interview and observation data for the education task group and the original research task group. No baseline data were collected for the decision-making task group because they were not available. Phase 2 data included recorded meeting transcript data for the three drug policy groups. Phase 3 data included post-interview data and survey data results for the three drug policy groups. Table 3 provides a summary of the data collection phases and data types for each group.

***Table 3. Data Collection Phases and Data Types for the Education, Research, and Decision-Making Task Groups***

<b>Data Collection Phases and Types</b>	<b>Education Task Group</b>	<b>Research Task Group</b>	<b>Decision-Making Task Group</b>
Phase 1: Baseline Interviews	✓	✓	×
Phase 1: Observations	✓	✓	✓
Phase 2: Meeting Transcripts	✓	✓	✓
Phase 3: Post-Study Interview	✓	✓	✓
Phase 3: Survey Questionnaire	✓	✓	✓

With regard to transcription of meetings and interviews, the researcher transcribed all baseline interview data and hired a transcription company to transcribe the meetings and the post-interview data. The baseline interview, meeting, and post-interview data were

transcribed verbatim. The data collection phases for the three drug policy groups are presented below.

### ***3.3.1 Detailed Description of Data Collection Phases for the Education Task Group***

*Phase 1: Baseline Interview and Observation Data.* Baseline interviews for the education task group were semi-structured. They gathered information on linkage and exchange processes, group interactions, information sharing, group characteristics, communication modes, and technology perceptions (see Appendix 1 for baseline questionnaires).

Baseline questions consisted of probes asking the education task group participants about group behaviour, linkage and exchange, communication modes, and technology perceptions. Baseline interviews for the education task group were conducted between June and August 2004 with 12 group members interviewed. Of the 12 respondents, two were researchers, nine were educators, and one was a decision-maker. Eight of the 20 participants were not available to interview for the following reasons: they referred to another subject within the group to speak on their behalf; it proved difficult to schedule an interview with them; or they participated at a later stage of the study.

Throughout the study, between January 2004 and November 2005, the researcher collected electronic notes, which were stored on a computer, in order to acquire observation data. Using Microsoft Word and Excel, the researcher recorded notes informally every two to three months. The notes primarily concerned the evolution of the education task group and its relationship with other groups.

*Phase 2: Meeting Transcript Data.* In phase 2, education task group face-to-face,

teleconferencing, and web-conferencing meetings were recorded using various technologies. Web-conferencing meetings were recorded with a computer monitor using Windows Media Encoder, which included the audio and web components of the meeting. Face-to-face meetings were recorded using a digital voice recorder. Similarly, teleconferencing sessions were recorded using a digital voice recorder with a telephone attachment to assure a higher quality recording. Because of time and budget constraints, the study included only four out of six teleconferencing meetings: March, May, July, and August 2004. Again, because of constraints, of the ten web-conferencing sessions, only four were included: April, June, August, and November 2005. One face-to-face session, June 2004, was recorded.

*Phase 3: Post-Interview and Survey Data.* In phase 3, post-interviews were conducted with key informants in the education task group. Of the seven respondents interviewed, five were educators, one was a researcher, and one was a decision-maker. The interviews were conducted between May and July of 2007 and were all taped and transcribed (see Appendix 3 for post-study questionnaire). The post-interviews were recorded using a digital voice recorder with an attachment to ensure the quality of the recording. Twenty surveys were administered to the education task group via e-mail, and four group members responded. Three of those who responded were educators, and one was a decision-maker. E-mail reminders were sent out to the other group members. There was no response from the three researchers within the group, two decision-makers, and 11 educators. It was assumed that the non-participants were too busy to participate in the survey. (See Appendix 4 for post-study survey).

### ***3.3.2 Detailed Description of Data Collection for the Research Task Group***

*Phase 1: Baseline Interview and Observation Data.* Baseline interviews with seven researchers and two decision-maker staff were conducted among the Income Based Deductible (IBD) research task group. Interviews were semi-structured and gathered information on the linkage and exchange process, group interactions, information sharing, group characteristics, communication modes, and technology perceptions. The researchers met twice in September 2004—one face-to-face meeting and one teleconferencing meeting. The group never met after that and was ultimately excluded from the study because of its infrequent meetings. The interviews were recorded using a digital voice recorder with a telephone attachment. The baseline interview data was used to describe decision-maker and researcher cultures within the domain of drug policy.

To obtain observation data on the second research task group, the researcher collected electronic notes, which were stored on a computer, throughout the study between January and June 2006. The notes were recorded informally by using Microsoft Word and Excel every two to three months. The notes primarily concerned the evolution of the research task group and their relationship with other groups.

*Phase 2: Meeting Transcript Data.* The research task group communicated in face-to-face and web-conferencing meetings throughout the study. One face-to-face meeting was included, February 2006; it was recorded using a digital voice recorder. All four web-conferencing meetings were included for the research task group: January, February, April, and June 2006. Web-conferencing meetings were recorded with a computer monitor using Windows Media Encoder. Windows Media Encoder recorded the audio and web components of the meeting.

*Phase 3: Post-Interview and Survey Data.* Post-interviews were carried out with informants from the research task group. Four of the five respondents were researchers and one was a decision-maker. The interviews were conducted between May and July of 2007 (see Appendix 2 for post-study questionnaire). Fourteen surveys were administered to the research task group, and seven members responded. Of the seven, six were researchers and one was a decision-maker. E-mail reminders were sent out to those who did not participate, six researchers and one decision-maker. It was assumed that the researchers and decision-makers that did not participate were too busy to do so. (See Appendix 4 for post-study survey).

### ***3.3.3 Detailed Description of Data Collection Phases for the Decision-Making Task Group***

*Phase 1.* No baseline interviews were conducted for the decision-making task group because the group members were unavailable for interviews.

*Phase 2: Meeting Transcripts and Observation Data.* Meeting data and observations were compiled during phase 2 data collection for the decision-making task group between September 2004 and January 2006. All synchronous (live) and asynchronous (pre-recorded) meetings were fully transcribed. Six of the synchronous (live) meetings were recorded using a digital audio recorder. The synchronous (live) meetings took place between September 2004 and February 2005. The 1 asynchronous (pre-recorded) meeting took place on January of 2006 and was recorded via digital audio recorder with a telephone attachment; it was also transcribed.

The researcher collected electronic notes for observation data, which were stored on a computer, throughout the study, between September 2004 and January 2006. The

notes were recorded informally by the researcher every two to three months, using Microsoft Word and Excel. The notes primarily concerned the evolution of the decision-making task group and their relationship with other groups.

*Phase 3: Post-Interview and Survey Data.* Post-interviews were carried out with key informants from the decision-making task group. The post-interviews included three researchers and two decision-makers. The interviews for the decision-making task group were conducted between May and July of 2007 (see Appendix 3 for post-study questionnaire). Twenty-seven surveys were administered to the decision-making task group via e-mail. Six of the 27 members responded. Three were decision-makers, and three were researchers. E-mail reminders were sent out to the other group members, asking for their participation. It was assumed that the remaining 19 decision-makers and staff and the two researchers that did not respond were too busy to do so. (See Appendix 4 for a post-study survey).

### ***3.4 Analysis Method***

The previous section described the data collection process. This section explains how the data analysis was carried out and includes an explanation of how the different data sources were analyzed.

#### ***3.4.1 Data Analysis Process***

*Baseline Interview Data and Observation Data.* For inputs, baseline interview data and observations allowed a general description of communication media used, group characteristics, context, research task, and culture. A general description was provided using baseline interviews and observation data without any coding for the following group inputs: group characteristics, communication medium, research task, context, and

culture.

*Meeting Transcripts and Post-Interview Data.* Content analysis was utilized to assess meeting transcripts and post-interview data. In general, content analysis is a data analysis approach that can be used to analyze qualitative data; it is a systematic process of analyzing communication messages and making inferences based on the analysis (Berg, 1989; Kondracki, Wellman, & Amundson, 2002). Content analysis involves the interpretation of textual data that has been categorized into concepts. Once the identification of concepts or categories has taken place, they are categorized into themes based on their relationships with each other (Lau & Hayward, 2000). When conducting content analysis, the researcher must use an appropriate content analysis strategy that meets the objectives of the study. For example, content analysis can take a deductive or an inductive approach. With an inductive approach, the researcher creates categories based on key words, phrases, and themes emerging from the data and not based on categories described in the academic literature. With a deductive approach, the researcher creates categories based on academic literature and classifies the data according to these categories.

The analysis focused on the linkage and exchange processes of the education, research, and decision-making task groups. The analysis method used in the study was qualitative direct content analysis (Hsieh & Shannon, 2005). This method of content analysis is specific to qualitative studies. It is one of three major qualitative content analysis strategies. According to Hsieh and Shannon (2005), the other two strategies are summative and conventional content analysis. Direct content analysis was used to analyze the meeting transcripts and the post-interview data. This method of content

analysis was selected for processes because it is an appropriate method of content analysis for a study that uses a conceptual framework.

In direct content analysis, one of the goals is to extend or validate a certain conceptual or theoretical framework within the study (Hsieh & Shannon, 2005). The use of a conceptual framework, as in this case study, helps to organize the initial relationships among variables and provides direction in designing a coding scheme to analyse the data (Hsieh & Shannon, 2005). The first step in the directed content analysis approach is to identify concepts as initial coding categories. In the study, three concepts were identified (social interaction norms, facilitation, and information exchange) as representing linkage and exchange, and they evolved into an initial coding framework that guided the analysis.

The process of direct coding includes both deductive and inductive elements. First, the researcher begins with an initial coding scheme or concepts. As he or she begins to code, new coding categories emerge, which are, in turn, coded. Any text that a researcher is unable to categorize within the original coding scheme receives a new code (Hsieh & Shannon, 2005).

The strength of this form of content analysis is that it can support or extend an existing framework or theory (Hsieh & Shannon, 2005). Additionally, when conducting an analysis, researchers are typically not naïve about prior literature that can help inform the study. Nevertheless, several disadvantages arise with this form of content analysis. First, the researcher may analyze the data with a strong, if informed, bias and, therefore, may tend to provide supportive as opposed to non-supportive evidence for the conceptual or theoretical framework (Hsieh & Shannon, 2005). Second, the researcher may design probes for the participants designed to elicit agreement with the conceptual framework

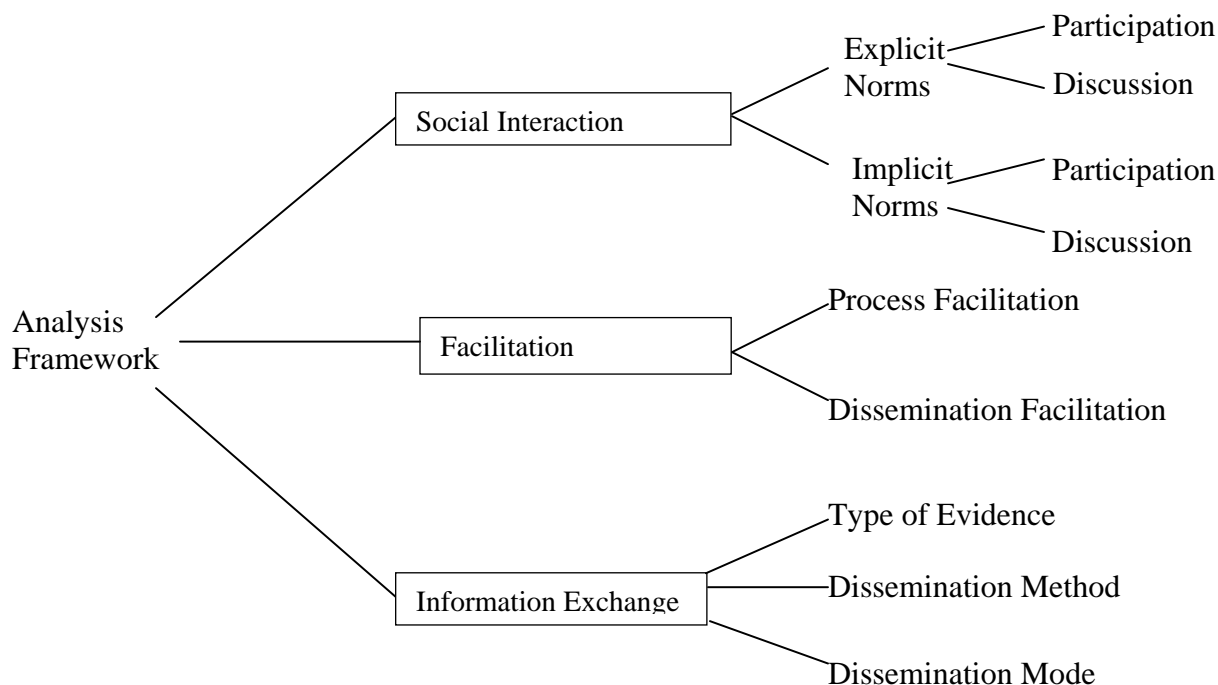
and, therefore, lend it unwarranted support (Hsieh & Shannon, 2005). Third, an over-emphasis on a conceptual framework or theory may tend to blind the researcher to other important contextual factors within the study (Hsieh & Shannon, 2005). As Hsieh and Shannon (2005) note, these limitations depend on the researcher's neutrality in the analysis process.

As noted earlier, the analysis in the study focused on the linkage and exchange process of three drug policy groups. For the analysis, groups of phrases or sentences provided an appropriate level of sampling for the post-interview and meeting transcript data. A subsequent step in the analysis was to extract and compile all of the responses. In this process, responses from the education, research, and decision-making task groups were separated from each other. The researcher familiarized himself with the data by reading the responses to post-interviews and meeting transcripts for each of these groups. With meeting transcripts and post-interviews, sentences and phrases were selected as the basic units of analysis and classified as belonging to categories listed below in Figure 4.

As appropriate, some phrases or sentences were assigned to more than one category. The a priori coding scheme generated only a provisional start list of categories for the analysis of meeting transcripts and post-interviews. The process of category development started deductively, and then other codes were added inductively as they emerged from the data. The data was coded by the researcher. The coding and results of the analysis were then reviewed by the thesis supervisor and one participant that was involved in the education, research, and decision-making task groups. This is consistent with the method of direct content analysis. For the conceptual categories, sub-categories were created to further clarify and enrich the analysis and facilitate the discussion and

elaboration of the findings. The framework used to guide the analysis of the data is provided in Figure 4.

**Figure 4. Qualitative Analysis Framework.**



### ***Social Interaction Norms***

The portion of the coding scheme used for analyzing social interaction norms focused on identifying both implicit and explicit norms that groups develop during the linkage and exchange process. Social interaction norms are “rules that a group uses for appropriate and inappropriate values, beliefs, attitudes and behaviours. These rules may be explicit or implicit” (Changing Minds, 2006).

*Implicit Social Interaction Norms.* An implicit social interaction norm refers to a group’s implicit rules guiding group discussions and participation. For example, “Hi, this is Roger. I hope everyone can hear me” makes use of an implicit discussion norm where group members introduce themselves before speaking. Since technology will primarily

affect group discussion and participation, the analysis focused on implicit discussion and participation norms.

*Explicit Social Interaction Norms.* An explicit social interaction norm refers to how the group introduces explicit rules guiding group discussions and participation. The group implements these norms explicitly within the group according to the different communication media. For example, “Please introduce yourself before you speak into the microphone” introduces an explicit rule for discussion. Since technology will primarily affect group discussion and participation, the analysis focused on explicit discussion and participation norms.

### ***Process and Dissemination Facilitator***

The coding scheme incorporated two main categories—process facilitation and dissemination facilitation—for the analysis of the facilitation process:

*Process Facilitation.* Categories for coding facilitator processes include the following: 1) encourages group participation; 2) proposes technology use; 3) summarizes discussion; 4) asks and answers questions; 5) explains the purpose of the technology; 6) greets participants when they arrive; 7) introduces self; 8) manages conflict within the groups; and 9) guides participants through the meeting and/or discussion. These categories were adapted from Clawson, Bostrom, and Anson (1993).

*Dissemination Facilitation.* The dissemination of research findings is broken down into three categories in accordance with CHSRF (2004). These categories describe 1) how the dissemination facilitator uses graphics, humour, and plain language during the presentation of research findings; 2) how the facilitator presents important messages at the beginning of the meeting; and 3) how the facilitator notes the limitations of the

research findings.

### ***Information Exchange***

The coding scheme for information exchange incorporated three categories. In the study, information exchange processes were defined in the context of the following: the type of evidence used by group members; the method through which transfer occurs; and the mode by which it occurs.

*Type of Evidence.* Type of evidence includes four categories: 1) data from the participants own research experience; 2) external literature; 3) colleagues work experience; and 4) task related discussions. This is similar to how Mehta et al. (1998) categorized type of evidence used in decision-making.

*Dissemination Mode.* The dissemination mode divides into three sub-categories, which describe how the exchange of information occurs during the meeting: 1) oral, 2) PowerPoint, or 3) text (e.g., text messaging).

*Dissemination Method.* The dissemination method divides into three sub-categories: 1) face-to-face; 2) teleconferencing; or 3) web-conferencing.

*Analysis of Post-Survey Questionnaire Data.* For the post-survey questionnaire, the average of Likert scale items was calculated. The survey data used in the study can be viewed as supplementary information in the analysis. The study focused on analyzing processes rather than outputs.

### ***3.4.2 Sample Coding of Meetings for the Education, Research, and Decision-Making Task Groups Using Phase 2 Meeting Transcript Data***

Direct coding content analysis was used as a method for coding the meeting transcripts for the education, research, and decision-making task groups. The process of direct

coding included both deductive and inductive elements. First, the analysis started with the development of an initial coding scheme to code the meeting transcripts. During the coding process, new coding categories were created when data did not fit into the initial coding scheme. For example, in the education task group, initially social interaction norms were coded using categories from the coding scheme as shown in Figure 4. However, new emergent categories not contained in the coding scheme in Figure 4 were also identified. Examples are provided below of how face-to-face, teleconferencing, and web-conferencing meetings were coded using the direct method for content analysis.

*Face-to-Face and Teleconferencing Coding Example.* The examination of the data from face-to-face and teleconferencing meetings showed that specific norms evolved either explicitly or implicitly during coding for social interaction norms. For example, in the research task group, a group member explicitly mentioned that he would be placing restrictions on talkative people. This produced a new code for explicit discussion norms for the research task group. An example of the social interaction code follows.

00:00 **Participant A:** Roger asked me to chair the meeting probably because I used  
 00:05 to be in the military and I know how to crack the whip. So I can rein-in  
 00:13 overly talkative people. So we've got two hours before lunch. I thought we'd  
 00:21 do is just start by maybe doing some introductions.

The direct content analysis method was used for two types of facilitator codes: process facilitation and a dissemination facilitation code. The coding scheme for process facilitator originally included 9 different process facilitation functions coded for: 1) encouraging group participation; 2) proposing technology use; 3) summarizing discussion; 4) posing and answering questions; 5) explaining the purpose of the technology; 6) greeting participants when they arrive; 7) introducing self; 8) managing

conflict within the group; and 9) guiding participants through the meeting or discussion. The coding categories related to the dissemination facilitator included: 1) using graphics, humour, and plain language during his or her presentation of research findings to decision-makers; 2) presenting key messages up front; and 3) noting the limitations of the research findings. These were the initial facilitation codes used while coding within the education, research, and decision-making task groups. As an example of coding using the predefined coding categories, the facilitator's ability in guiding participants through the meeting and/or discussion is demonstrated in several passages:

1 00:21 **Facilitator:** I thought we'd do is just maybe doing some introductions.  
 .....  
 113 20:21 **Facilitator:** So let's jump ahead and look at the objectives.  
 .....  
 166 30:09 **Facilitator:** Now let's look at the deliverables. Now these again are broad brush, and you know that gives us a sense now what we're hoping to do.

In the passages above, the text indicates that the facilitator guided the participants through the meeting and/or discussion at several points during the meeting. Therefore, each occurrence is a separate instance of the function of "Guiding participants through the meeting and/or discussion"; in the example, three discrete instances of "Guiding participants through the meeting and/or discussion" were noted.

New codes emerged from the data for facilitation that had not been part of the original coding scheme. For example, "Discussing future meetings" and "Providing reflection on group discussions" were two new codes that were generated. If a facilitator discussed future meetings or providing reflection on the group process in one meeting's data, previously coded data was re-examined with these new codes in mind. Further, a

similar process was applied to the information exchange process.

*Web-conferencing Coding Example.* During coding for social interaction norms in web-conferencing meetings, specific norms were sought that would apply either explicitly or implicitly to discussion or participation. With the use of web-conferencing, the group discussion process changed because of new technological features, such as text messaging, application sharing, emoticons use, and voting/polling features. There were new implicit and explicit discussion and participation norms that were introduced to the groups using the web-conferencing technology. For example, in the education task group, the implicit uses of the technology for discussion included text messaging, white boarding, emoticon expression, and voting or polling. The implicit uses of the technology for group participation included hand raising. In each instance where the group was not told specifically to use the feature by the group facilitator or another group member, the feature would be coded as an implicit norm. If the group were told explicitly to use a certain feature, then the feature would be coded as an explicit norm. In practice, most of the features were used in an implicit fashion. A similar process applied to the analysis of facilitation and information exchange processes. A sample transcript illustrating how web-conferencing transcripts were coded follows. Note that the word “Audio” indicates that a speaker was talking into a microphone (i.e., half-duplex technology).

[10:15]

**Text Message: Participant A:** Sure [Code for Text Msg Use (General Use)]

**Audio: Participant B:** N.S. will be responsible for the Agenda...I guess

**Audio: Participant C:** That’s a great suggestion, John. Do we have a volunteer for that? I wouldn’t want to do it if I’m not going to be here.

**Hand Raised:** Participant D [Code for Hand Raised]

**Participant E:** I volunteer it’s Michael’s turn to prepare that agenda. Over. [Implicit use of discussion norm *Over*]

### **3.4.3 Sample Coding of Post-Interviews for the Education, Research, and Decision-Making Task Groups Using Post-Interview Data**

The method used for coding the post-interview data for the three drug policy groups was direct coding content analysis. As noted, the analysis focused on the linkage and exchange processes of three drug policy groups. In the study, groups of phrases or sentences provided the appropriate level of sampling for the post-interview data. A subsequent step in the analysis involved extracting and compiling all of the responses. During this process, the responses from each group were kept separate from other data. For post-interviews, selected sentences and phrases were coded in relation to previously articulated categories shown in Figure 4. Emerging categories were given new codes.

During the coding of the post-interview data, occurrences of a participant noting a particular theme were included. For example, for face-to-face meetings, under discussion norms, a participant in the education task group stated the following:

Face-to-face, of course, has the advantage of being there, seeing the person, being able to read their eyes, facial expressions, body language, and I suppose to some extent it holds your attention better if you're getting a little tired or whatever. You can see that and adjust and make sure you have everybody's attention.

(Respondent (E) #8)

This is an example of the respondent commenting about the theme "Richness". Every time the theme appeared, it was coded.

### ***3.5 Operationalizing Inputs, Processes, and Outputs of the Conceptual Framework***

The study objectives were to 1) improve the understanding of how ICT can affect the linkage and exchange processes and 2) provide guidance on the use of ICT to

facilitate how drug policy groups interact. To achieve this, a conceptual framework was introduced in the literature review section of the thesis. The variables in the conceptual framework are operationalized below.

*Inputs.* Inputs are factors that can influence the linkage and exchange process. Different inputs influence linkage and exchange processes and outputs in different ways. For example, in the decision-making task group, the task was to disseminate research findings to decision-makers (research task input) within the drug policy domain (i.e., context). Because group members worked at a distance from one another, the group used teleconferencing for communication (communication medium input). The group's size was about 27 individuals, each with different roles (a researcher role or a decision-maker role), with different levels of experience, and with different program goals and objectives (group characteristics). The group had two distinct cultures, a decision-making policy culture and research policy culture; both groups had different perspectives on timeliness and relevancy of research as well as how that research should be communicated.

These five inputs (communication medium, group characteristics, context, research task, and culture) can effect group linkage and exchange processes, such as social interaction, information exchange, and facilitation. Each distinct input will have different effects on group linkage and exchange processes and outputs. The five inputs described in the TELE conceptual framework are research task, communication medium, context, group characteristics, and culture.

*Research Task.* For inputs, a research task can be defined as a series of six steps where communication linkages and information exchanges between researchers and decision-makers occur throughout the entire knowledge translation (KT) process. These

steps are: KT1) defining research questions and methodologies; KT2) conducting research; KT3) publishing research findings in plain language and accessible formats; KT4) placing research findings into the context of other knowledge and socio-cultural norms; KT5) making decisions and taking action informed by research findings; and KT6) influencing subsequent rounds of research based on the results of how research knowledge is used. Each of the groups may be working within one or more of these knowledge translation processes (CIHR, 2002).

*Communication Medium.* For inputs, the communication medium for linkage and exchange between group members may be defined as a process that occurs synchronously or asynchronously. Synchronous communication can occur in face-to-face or distant methods. For example, the education task group met in synchronous face-to-face, teleconferencing, and web-conferencing meetings. Asynchronous modes included recorded teleconferencing sessions, which were used by the decision-making task group.

*Group Characteristics.* For inputs, group characteristics may be defined as basic background information on the group; including the size of the group; the roles of various members of the group; and the experience of the members within their domain of work. Different groups within the study had different group sizes, roles, and experiences that influenced the linkage and exchange process; these had to be taken into account.

*Context.* Linkage and exchange can take shape in different types of policy domain areas and groups. Context is the policy domain in which the linkage and exchange occurs and the type of group involved in the linkage and exchange process. For example, the research task group was working within the drug policy domain. The group focused on evaluating physician education policy interventions.

*Culture.* Group culture can be defined within the context of linkage and exchange. According to the two-communities perspective on linkage and exchange, there is a cultural gap between decision-makers and researchers (Rich, 1997). Fuhrman (1994) suggests that researchers and decision-makers use different languages, work on different timelines, and respond differently to incentives. Leung (1992) claims that a sense of distrust and antagonism permeates interactions between the two communities. Group culture is described within this context.

*Processes.* Processes were characterized in terms of how the group worked together in relation to linkage and exchange. Each group worked together differently depending on the type of inputs influencing the linkage and exchange process. The study examined three different linkage and exchange processes: social interactions, facilitation, and information exchange. The various inputs had different effects on each of the group processes. When web-conferencing was used for communication, the social interactions norms within the education task group were similar to those for the research task group. However, there were also social interaction norms that were different. Further, the web-conferencing session restricted how group members could share information. For example, group members had difficulty sharing large files that contained many pages on the web-conferencing whiteboard. Another example pertains to facilitation: the facilitator had to be more engaging than usual with participants and be more aware of them since there were fewer non-verbal cues associated with web-conferencing interactions. The group processes included in the study are social interaction, information exchange, and facilitation.

*Social Interactions.* For processes, social interaction norms are “rules that a group

uses for appropriate and inappropriate values, beliefs, attitudes and behaviours. These rules may be explicit or implicit” (Changing Minds, 2006). The study examined how social interaction norms are created within the context of linkage and exchange. Specifically, the study examined the results of communication media upon group discussions and participation social interaction norms.

*Information Exchange.* With processes, the information exchange process is defined in the context of the type of evidence used by group members, the method through which group members transfer information, and the mode by which they transfer it. A method adapted from Mehta et al. (1998) classifies evidence into four categories: 1) data from the participants’ own research experience; 2) data from external literature; 3) data from the work experience of colleagues; and 4) data from task-related discussions. The process by which members exchanged information during the meeting included verbal exchange, PowerPoint, and text messages. The communication mode was face-to-face or distance (teleconferencing or web-conferencing).

*Facilitation.* The facilitation process may be defined in terms of how the facilitator manages the group linkage and exchange interaction process. Clawson, Bostrom, and Anson (1993) recommend studying the following behaviours to conceptualize the facilitation process: 1) the facilitator encourages group participation; 2) the facilitator proposes technology use; 3) the facilitator summarizes discussion; 4) the facilitator asks and answers questions; 5) the facilitator explains the purpose of the technology; 6) the facilitator greets participants when they arrive; 7) the facilitator introduces self; 8) the facilitator manages conflict within the groups; and 9) the facilitator guides participants through the meeting and/or discussion. In addition, the study applies

the CHSRF (2004) model to assess the traits of a dissemination facilitator presenting to decision-makers. This model includes the process of: 1) how the dissemination facilitator uses graphics, humour, and plain language; 2) how he or she presents key messages up front; and 3) how the facilitator acknowledges the limitations of the research findings.

*Output.* Outputs are the end-result of group efforts. They result from a process and are measured quantitatively to provide evidence that the TELE process has taken place. In the study, outputs fall into two categories: 1) satisfaction with the linkage and exchange; and 2) perceptions on the linkage and exchange engagement. Perceived satisfaction with linkage and exchange processes include the group's satisfaction with the social interaction, information exchange, and facilitation outputs. With respect to linkage and exchange engagement outputs, trust, cohesion, and conflict are factors. Appendix 5 includes the questionnaire items used to measure group outputs. Details of the linkage and exchange process outputs follow:

*Satisfaction with Linkage and Exchange.* For outputs, social interaction, facilitation, and information exchange outputs were studied to determine how satisfied group members were with the linkage and exchange process.

*Engagement Outputs.* For outputs, engagement outputs include trust, cohesion, and conflict. Engagement outputs were studied to determine how satisfied group members were with the levels of conflict, trust, and cohesion.

### ***3.6 Researcher Role within the Study***

The researcher was neither an active member of the education, research, and decision-making task groups, nor did he participate in group discussions. The researcher did participate in the education task group, but only as a technical facilitator, helping

group members to familiarize themselves with the web-conferencing technologies and solving technical glitches that occurred during the web-conferencing meeting. For example, a group member may have needed guidance on how to install a microphone properly.

### ***3.7 Ethical Considerations***

General safeguards for interview participants included the use of an informed consent form, a discussion of the interview and survey objectives, and the use of a tape recorder to ensure accuracy. Prior to the interviews, the researcher read a standard ethics protocol to all participants. In addition, the researcher fulfilled all arrangements made with the participants in the study and the identity of the participants has been kept confidential.

### ***3.8 Chapter Summary***

This chapter included a description and rationale for the methodology process employed in this study. The data collection processes as well as the data analysis procedures of this study were described. Also included were a discussion of how the conceptual framework was operationalized and a description of ethical considerations applied in the research study.

## Chapter 4: Results

The previous chapter introduced the methods of this study, presented a description of the data collection and analysis process, and discussed how the conceptual framework was operationalized. This chapter focuses on the study results. The first part uses baseline interview and observation data to present a description of group inputs as outlined in the conceptual framework. Specifically, the inputs provide a description of drug policy group characteristics, communication media, research task, context, and culture. The second part of the chapter uses meeting transcript and post-interview data to discuss the effects of communication media (face-to-face, teleconferencing, and web-conferencing) on linkage and exchange processes, specifically focusing on social interaction norms, facilitation, and information exchange as identified in the conceptual framework. The third part of the chapter uses survey data to describe the analysis of linkage and exchange outputs.

### *4.1 Drug Policy Group Inputs: Describing Group Characteristics*

Group characteristics represent the first input of the TELE conceptual framework as described in Chapter 2 and Chapter 3. This section provides a detailed review of the group characteristics of the education, research, and decision-making task groups.

*Education Task Group (Group Characteristics).* The education task group consisted of academic detailers who produced research reviews regarding new drugs for dissemination to physicians. As noted earlier, academic detailing involves the study of how knowledge is used, defining the objectives of knowledge; clarifying the parts that practitioners and opinion leaders have in the academic detailing process; and supporting the implementation of research knowledge (KUSP, 2003).

Of the 26 potential participants in the education task group, 20 were included in the study. The six that were excluded were observers and administrative assistants. The 20 participants included in the education task group were researchers, educators, and decision-makers. The education task group was comprised of ten (50%) men and ten (50%) women. Of the 20, three (15%) were decision-makers; three (15%) were researchers; and 14 (70%) were educators. All participants had at least a bachelor's degree. Thirteen of the educators were pharmacists by training and one was a physician. All three researchers were experienced drug policy researchers. The educators were from five Canadian academic detailing programs located in British Columbia, Alberta, Saskatchewan, Manitoba, and Nova Scotia. A one- to ten-year range of experience in academic detailing was noted for the different academic detailing programs. All the researchers involved in the education task group were based in British Columbia, and each had over ten years of drug policy research experience. The list of participants was obtained from an administrative member of the education task group. Consent to participate was obtained via e-mail. Consent was also obtained from participants during a teleconference call held in March 2004. No incentives to participate in the study were offered or given to the educators, researchers, or decision-makers. All group members had experience using e-mail, teleconferencing, and desktop computers.

*Research Task Group (Group Characteristics).* Throughout the study, two research task groups were included. The first research task group worked on evaluating the British Columbia drug policy Fair Pharmacare Income Based Deductible (IBD) drug policy program. Baseline interview data were collected for the research task group; however, the group was dropped because of its infrequent meetings. A second research

task group was included throughout the study as a replacement for the original research task group.

The second research task group focused on evaluating the cost-savings of physician educational interventions; it included various drug policy researchers and decision-makers working together on the evaluation of Education for Quality Improvement of Patient Care (EQIP) project. Baseline data were not collected for this group because they were included at a later stage of the research process, which made it difficult to conduct baseline interviews. However, baseline interview data was retained from the original research task group and used to describe the culture of linkage and exchange between researchers and decision-makers in drug policy.

There were 17 potential participants in the group, of which 14 were included in the study. The three excluded were observers and administrative assistants. The included participants were either researchers or decision-makers. The research task group had nine (64%) men and five (36%) women. The group consisted of 12 (86%) researchers and two (14%) decision-makers. All researchers had a level of education higher than a bachelor's degree. One of the researchers was located in the United States and the remaining 11 were in Canada (Victoria and Vancouver, British Columbia). No incentives to participate in the study were offered to decision-makers or researchers. The list of participants was obtained from an e-mail distribution list. Consent to participate was obtained through a consent form, which was returned via fax.

*Decision-Making Task Group (Group Characteristics).* As part of a Health Canada funded research program, a group of researchers met with decision-makers and their staff members on a monthly basis using synchronous (live teleconferencing) and

asynchronous (pre-recorded teleconferencing) communication methods to disseminate research information on the latest drug policy research trends.

There were 32 potential participants identified in the decision-making task group, of which 27 were included. The five excluded were observers and administrative assistants. The 27 participants included in the decision-making task group were researchers and decision-makers and staff from provincial Canadian drug plans. The decision-making task group was composed of 13 (48%) men and 14 (52%) women, consisting of 22 (82%) decision-makers and staff as well as five (18%) researchers. All participants had a minimum level of education, holding at least a bachelor's degree. All decision-makers were senior representatives of seven major Canadian drug policy programs located in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, and Prince Edward Island. All researchers, with one exception, were university teaching professors working in the field of drug policy. No incentives to participate in the study were offered to the decision-makers and staff or researchers. The list of participants was obtained from an e-mail distribution list. Consent to participate was obtained via a consent form that was returned through e-mail. All group members had prior experience using e-mail and teleconferencing.

#### ***4.2 Drug Policy Group Inputs: Describing Communication Media***

The communication medium used by the groups is the second input. A detailed discussion is provided in this section on how the groups communicated through the different communication media.

*Education Task Group (Communication Media).* The education task group communicated using face-to-face, teleconferencing, and web-conferencing from January

2004 to December 2006. The group officially met face-to-face in June 2004; prior to that date, they communicated via teleconferencing. The group needed to introduce new ways to facilitate linkage and exchange for their geographically dispersed group. In September 2004, the group used teleconferencing for voice communication and web-conferencing to share agenda information. Only in January 2005 did the group completely switch over to using web-conferencing for communication.

The analysis considers face-to-face, teleconferencing, and web-conferencing meetings of the education task group. A total of four out of six meetings were included throughout the study for teleconferencing: March, May, July, and August 2004. Of the ten web-conferencing sessions, four were included: those of April, June, August, and November 2005. One face-to-face session (June 2004) was included in the study of the education task group. Not all meetings were considered because of time and budget constraints.

Different equipment was needed for each mode of communication. For teleconferencing, the participants required only a telephone to connect with other participants. In face-to-face sessions, participants used a computer, a projector, and a screen to view PowerPoint slides. For web-conferencing sessions, participants required a computer, microphone, speaker, and an Internet connection. The number of participants that participated in all meetings ranged from 6-15 and the duration was between 53 minutes and five hours for all meetings. The meeting processes were different for each type of communication medium for the education task group. In face-to-face meetings, the group first set up a meeting time convenient for members at a specific location and sent out agenda items a week or more before the meeting. The group then arrived at the

designated location, where members introduced themselves at the start of the meeting. A projector displayed PowerPoint slides on a screen with agenda items and other relevant meeting material. The group then discussed the agenda items on the projector screen. Within the meeting, a chair usually facilitated the group process. The group continued through agenda items, occasionally taking breaks during longer meetings. Sample items extracted from agendas focused on the education task group's evaluating physician education interventions; obtaining funding for their programs; and discussing roles and relationships. In general, face-to-face meetings lasted longer than web-conferencing or teleconferencing meetings and did not occur as frequently.

With regard to teleconferencing meetings, the education task group met the third Tuesday of every month with a rotating chair (i.e., process facilitator) to facilitate the group process. The rotating chair was selected according to location. For example, if British Columbia presented in one month, Alberta presented in the second month, and so on. Prior to the teleconferencing meetings, the education task group members sent out an agenda a few days in advance of the meeting; the meeting information and related documents were transmitted via e-mail. In the e-mail, a toll-free number and meeting code were also included so that group members could gain access to the teleconferencing meeting. Education task group members usually logged in a few minutes prior to the meeting. The group members generally opened up e-mailed documents if needed during the meeting. Sample topics discussed in the education task group teleconferencing meetings included communication needs, physician education materials, relationships with funding agencies, a literature synthesis project, roles and relationships, and group identity issues.

In web-conferencing meetings, the education task group met the third Tuesday of every month with a rotating chair (i.e., process facilitator) to facilitate the group process. Agenda items were sent in advance along with a link to the web-conferencing meeting. Group members were asked to log in at least 20 minutes earlier than the designated meeting time so that any technical glitches could be addressed. The facilitator placed agenda items on the whiteboard and performed a sound check. During the sound check, the facilitator asked group members to speak into the microphone. If they heard the speaker clearly, they would signal using the voting and polling feature with the checkmark. If they did not hear the speaker clearly, they would signal with an x. The group followed the agenda and crossed out items as they finished them. Sample agenda topics included grant proposals, physician education materials, literature, time lines and deliverables for the group evaluation project, and status reports.

*Research Task Group (Communication Media).* The research task group communicated in face-to-face and web-conferencing meetings. Between January and June of 2006, six months' worth of meeting data were collected for the group. In the analysis, four web-conferencing meetings (those of January, February, April, and June 2006) and one face-to-face meeting (February 2006) were included. No web-conferencing or face-to-face meetings were excluded from the analysis for the research task group during the data collection period. For web-conferencing sessions, participants needed a computer, a microphone, a speaker, and an Internet connection to participate in the meetings. No technology was used in the face-to-face meeting. The number of participants participating in all meetings (face-to-face and web-conferencing) ranged from 8-19, and the duration ranged between 43 minutes and 1.5 hours.

For face-to-face meetings, the research task group first set up a meeting time convenient for members at a specific location. Agenda items were sent out at least one week before the meeting. The group would arrive at the designated location, where members would introduce themselves at the outset of the meeting. The group distributed documents in paper format during the meeting. The research task group then discussed the agenda items. The process facilitator, also known within the group as the meeting chair, would facilitate the meeting. The group continued to take up agenda items without breaks because the allotted time was not long. Sample group discussion topics included developing clarity on the project, defining group roles, building group consensus, and discussing project goals.

The research task group attempted to meet every month in web-conferencing meetings. Approximately one week before the meeting, the research task group sent out the meeting agenda along with a link to the web-conferencing meeting. PowerPoint presentation slides were placed on the whiteboard for the entire group to see. A sound check was performed, in which the process facilitator ensured that all participants could be heard during the meeting. The sound check process was identical to the process followed by the education task group. The research task group members followed the agenda and crossed out items as they completed them. Sample group discussion topics included developing group roles, attending conferences, reviewing group methodologies, achieving project deliverables, moving to new offices, and discussing the research process.

*Decision-Making Task Group (Communication Media).* The decision-making task group used two modes of communication: live (synchronous) and pre-recorded

(asynchronous) teleconferencing meetings. The group met in a total of six live teleconferencing meetings and one pre-recorded meeting. The live teleconferencing meetings occurred between September 2004 and February 2005. Only one pre-recorded meeting occurred in January of 2006. The analysis included all of the live and pre-recorded meetings.

For teleconferencing, the participants needed a telephone to connect with others. A number was sent to each participant via e-mail with appropriate meeting details and PowerPoint slides. It was difficult to tell how many participants logged in to the meetings because not all participants introduced themselves. However, it is estimated that between 8-10 participants, including the chair and the presenter, participated in the meetings. This number was derived from the number of beeps that occurred when someone logged in to the meeting.

Regarding the structure of the live teleconferencing, the format was a 15 minute presentation with another five minutes for questions. The meeting times ranged from 18 to 20 minutes. The meetings were very structured. The chair (i.e., process facilitator) introduced the speaker (i.e., dissemination facilitator), and the speaker started the presentation with research conclusions. Conclusions were presented first so that any decision-maker logging on to the teleconferencing could listen to them and either stay for the explanation or leave. The structure was similar in the pre-recorded meeting, but this meeting offered no opportunity for questions.

#### ***4.3 Drug Policy Group Inputs: Describing Research Task***

Here, the third input, research tasks of the drug policy groups, are described. Table 4 provides a summary of the specific tasks for each group.

**Table 4. Summary of Education, Research, and Decision-Making Task Group Research Tasks**

<b>Knowledge Translation (KT) Tasks</b>	<b>Education Task Group</b>	<b>Researcher Task Group</b>	<b>Decision-Making Task Group</b>
KT1 Defining Research Question	✓	✓	
KT2 Conducting Research	✓	✓	
KT 3 Publishing in Plain Language	✓		✓
KT 4 Contextualizing	✓		
KT 5 Applying Findings	✓		

Specifically, within this research project, research task group members worked together on evaluating the cost-savings of physician educational interventions. Therefore, their task was a research task involving collaboration on an evaluation of an intervention. According to the CIHR model, this would be similar to carrying out KT1 and KT2, where the group decides on research questions and methods and then conducts the research.

The specific task for the education task group was to evaluate physician education (i.e., academic detailing) programs across the country; to use the evaluation information within the context of the local programs; and then to apply it to improve local physician educational programs. According to the CIHR task model, this would be similar to carrying out steps KT1, KT2, KT3, KT4, and KT5, which are agreeing on research questions and methods; conducting the research; creating research findings; publishing in plain language; contextualizing to local settings; and applying the findings to improve local practice.

The primary task of the decision-making task group was to provide a forum for learning and exchanging ideas between decision-makers and researchers. Therefore, the

specific task was the dissemination of information, which is similar to KT3 task--the publication and dissemination of research findings.

#### ***4.4 Drug Policy Group Inputs: Describing the Group Context***

The education, research, and decision-making task groups worked in the policy context of drug policy. This context was complex for several reasons. First, multiple groups with subgroups worked together in a disjointed fashion separated by distance and time. Second, drug policy groups used different approaches with different levels of success to improve drug policies, prescribing, and use. For example, the education task group focused on education through the application of academic detailing, a physician educational outreach approach, to influence physician prescribing and use. The research task group conducted policy evaluations later used to inform drug policy decisions. The decision-making task group focused on presenting drug policy research to influence drug policy decision-making.

Furthermore, each of these groups had different goals, objectives, group structures, communication needs, incentive systems, values, histories, and stakeholder groups to which they were responsible. Each of these groups was continuously evolving, shifting, changing, and adapting to changes in the drug policy environment. See Appendix 6 for a more detailed description of the context and interactions between the groups.

#### ***4.5 Drug Policy Group Inputs: Describing the Group Culture***

The two-communities model of linkage and exchange suggests a cultural divide between decision-makers and researchers (Rich, 1997). These cultural divides between researchers and decision-makers can be caused by differences in culture, reward systems,

communication styles, perspectives on time, and research relevance, as noted in the literature review.

In fact, within the decision-making and research task groups, cultural divides did exist. For example, in the baseline interviews from the original research task group, drug policy decision-makers expressed that they were constantly under time pressure to make a quick decision or statement on issues; noted that they were reactive to different situations that caused them to focus less on research; and stated that they were uninterested in lengthy research processes.

Researchers noted that decision-makers understood the results of research and might be aware of the studies, but still made decisions in conflict with the research. Even though cultural divides existed, decision-makers nevertheless acknowledged the value of research for guiding the policy decision-making process. Decision-makers and researchers also acknowledged the importance of maintaining strong linkage and exchange relationships between the two groups. Therefore, the culture of researchers and decision-makers within the study reaches the same conclusions as those of the two-communities model for linkage and exchange.

Within the education task group, however, the culture of linkage and exchange was different. The goal of the education task group was to collaborate with physician educational outreach programs to evaluate and improve the state of their local programs. Within their culture, educators sought to prove that their programs were effective so that they might continue to obtain funding from decision-making organizations. This helped create a culture of collaboration between the education task group members, encouraging them to work together to demonstrate the effectiveness of their programs.

#### ***4.6 Drug Policy Group Processes: Social Interaction Norms in Face-to-Face, Teleconferencing, and Web-conferencing Meetings***

Here, results from the analysis of social interaction norms of the three drug policy groups are reviewed. In the analysis of social interactions, the primary focus is on the effects of communication media (face-to-face, teleconferencing, and web-conferencing) on discussion and participation norms.

##### ***4.6.1 Effects of Communication Media on Discussion Norms***

This section discusses effects of communication media (face-to-face, teleconferencing, and web-conferencing) on implicit and explicit discussion norms in the education, research, and decision-making task groups.

*Face-to-Face.* Only the education and research task groups communicated in a face-to-face setting. Phase 2 meeting transcript data revealed that explicit discussion-related social interaction norms were present within both the education and research task groups. In the education and research task groups, an explicit restriction on the amount of time allotted for group members to speak was introduced. Each individual norm occurred once within one sampled face-to-face meeting. No implicit discussion norms were found in the analysis. Using phase 3 post-interview data, 5/12 of the respondents within both the education and research task groups described face-to-face discussions as more immediate, spontaneous, and richer than other forms of communication media (e.g., teleconferencing and web-conferencing). Furthermore, respondents noted that complex discussions and original topics were conducted better in face-to-face meetings. Table 5 provides a summary of themes that emerged from the phase 3 post-interview data for both groups.

**Table 5. Education and Research Task Groups: Face-to-Face Discussion Norm Themes (Phase 3: Post-Interview Data)**

Discussion Norm Themes	Freq (n)
Immediacy, Spontaneity, and Richness of Discussions	4
Original Topics and Complex Discussions are More Effective in Face-to-Face	2

*Legend:* Freq (the number of instances occurring in all meetings). *Note:* Respondent (E) #1 was quoted twice.

A few statements on immediacy, spontaneity, richness of discussions, and that original topics and complex discussions are more effective in face-to-face meetings are presented below.

Face-to-face meetings are more flexible, you can talk in breaks and you can have more spontaneous and casual conversations. (Respondent (R) #4)

Face-to-face of course has the advantage of being there, seeing the person, being able to read their eyes, facial expressions, and body language. (Respondent (E) #8)

There are certain topics that you can't discuss in technology-enabled environments. Original topics have to be done in face-to-face. For example, most recently, we were discussing what our vision, mission, and logos should be. We tried doing that over web-conferencing a few weeks ago and it was quite difficult to do. So we started the discussion last week in Halifax when we were face-to-face; it made it a little easier. So topics like that were a little difficult to do over a teleconference or a web-conference. (Respondent (E) #1)

*Teleconferencing.* For teleconferencing meetings, the analysis of phase 2 meeting transcripts suggests that the education and decision-making task groups introduced explicit and implicit discussion norms to help identify speakers during the live teleconferencing meetings. The explicit and implicit discussion norms introduced within the group were to help identify the speaker on the teleconferencing call. In face-to-face

meetings, group members can see each other when speaking. However, when group members communicated via teleconferencing and were not familiar with each other's voices, the group members implicitly and explicitly began to introduce discussion norms to identify the speaker.

When combining phase 3 post-interview results of both the education and decision-making task groups, 5/12 of the respondents commented, some more than once, on the effects of teleconferencing on discussion norms. Respondents noted that teleconferencing helped improve group discussions and group communications; however, at times, improper phone etiquettes disrupted group discussion. Table 6 provides a summary of the themes that emerged in teleconferencing discussion norms for the education and decision-making task groups.

**Table 6. Education and Decision-Making Task Groups: Teleconferencing Discussion Norm Themes (Phase 3: Post-Interview Data)**

<b>Discussion Norm Themes</b>	<b>Freq (n)</b>
Phone Etiquette	3
Improved Discussions	3
Improved Group Communication	3

*Legend:* Freq (the number of instances occurring in all meetings) *Note:* Respondent (D) #17, Respondent (D) #15, and Respondent (D) #16 were quoted more than once.

A few examples of statements about the importance of etiquette, how teleconferencing improved group discussions, and helped improve communication between drug policy groups are outlined below to demonstrate the point.

The only issue with teleconferencing is a break in reception and inappropriate phone etiquette, such as paper shuffling and members not muting their phone when they were not speaking. (Respondent (E) #11)

There were times when I did have questions. So having the presenter there to respond was just useful. If it were pre-recorded, I would be able to send an e-mail

asking any questions that I might have after the fact and that would be helpful. But, I just might decide not to do that. Whereas if I'm on the line with someone and have the opportunity to ask in person, then I would ask that question.

(Respondent (D) #15)

I think the live teleconferencing produced a bridge where none existed. I mean the chances of a researcher in Boston presenting to drug plans across Canada was very low. He might have presented that at a conference to drug plans, but his conference schedule doesn't correspond with theirs. So I think the most important difference is simply that it happened. It is a communication link that was at least moderately acceptable by a small number of decision-makers and didn't cost very much and altered the nature of the interaction by creating a link that is absent now. (Respondent (D) #17)

*Web-conferencing.* Table 7 provides a summary of the use of web-conferencing features used implicitly and explicitly during the meetings. The results are based on the phase 2 meeting transcript data. Table 7 includes the number of times a function was used in the sampled web-conferencing sessions.

When web-conferencing was introduced to the education and research task groups, different explicit and implicit discussion norms developed, as the analysis of the phase 2 meeting transcript data indicates. The functions used most often by both groups were half-duplex audio for voice communication, emoticons, application sharing, whiteboarding, voting and polling, and text messaging.

**Table 7. Education and Research Task Groups: Frequency in the Use of Web-Conferencing Features to Support Discussion Norms (Phase 2: Meeting Transcript Data)**

	Education Task Group		Research Task Group	
	Freq	Mtgs	Freq	Mtgs
<b>Implicit Discussion Norms</b>				
Voting	9	2/4	1	1/4
Emoticons	3	2/4	4	1/4
Application Sharing	2	2/4	0	0/4
Text Message	160	4/4	77	4/4
Half-Duplex Audio for Communication	NA	4/4	NA	4/4
Whiteboard	60	4/4	14	4/4
<b>Explicit Discussion Norms</b>				
Group Starts off with Sound Check	NA	4/4	NA	4/4
Voting For Sound Check	NA	4/4	NA	4/4
Over After Speaking	261	4/4	47	4/4

*Legend:* Freq (the number of instances occurring in all meetings), Mtgs (number of meetings in which the theme occurred), NA (Not Available–could not be quantified).

When combining the phase 3 post-interview results of the education and research task groups, 9/12 of the respondents commented, some more than once, on the effects of web-conferencing on group discussions. Respondents indicated that certain web-conferencing functions improved group discussions through voting and polling; through the ability to identify the speaker through the participant screen; and through sharing information via the whiteboard and application sharing. However, other respondents noted that web-conferencing placed limitations on discussions by reducing spontaneity and immediacy, by dampening socio-emotional interactions, and by enforcing a rigid communication structure. Other respondents noted that web-conferencing changed the group interaction from socio-emotional to text-based interactions. Table 8 provides a summary of discussion norm themes for both the education and research task groups.

**Table 8. Education and Research Task Groups: Web-Conferencing Discussion Norm Themes (Phase 3: Post -Interview Data)**

<b>Discussion Norm Themes</b>	<b>Freq(n)</b>
Web-Conferencing Limits Group Discussion	4
Effects of Structure on Group Discussion	3
Meeting Within the Text	3
Web-Conferencing Features that Improve Discussion	2

*Legend:* Freq (the number of instances occurring in all meetings). *Note:* Respondent (E) #12, Respondent (R) #2, and Respondent (R) #4 were quoted more than once.

Sample statements from the respondents demonstrate the themes presented in Table 8.

The biggest disadvantage to web-conferencing is less spontaneity and less socio-emotional interactions. (Participant (R) #3)

Just in the sense that if somebody was talking on and on and you wanted to interrupt them you wouldn't be able to do it vocally. You would have to do it via e-mail or a little text note or something like that. (Participant (E) #8)

When our face-to-face meetings were not disciplined, moving to web-conferencing made it more disciplined. Because it was structured communication, where only one person could speak at a time, we kept to the agenda much more: there was less socializing; less tangent stuff and instead of that meeting lasting two hours it lasted one hour. (Participant (R) #2)

[Web-conferencing] allows people to engage visually in addition to being able to talk and listen, which is a key component particularly when a lot of our work was going through education materials. So like physician portraits, for example, everybody is looking at the same thing on a screen, and that kind of keeps the group together for one, and it also helps make sure that we're all talking about the same thing. (Participant (R) #5)

It was a much more effective way of holding our meetings via web-conferencing

because of the additional interactive tools. We used the audio function, had the ability to vote, to display information, which added a number of more dimensions to the interactions. (Participant (E) #9)

#### ***4.6.2 Effects of Communication Media on Participation Norms***

In this section, the effects of communication media (face-to-face, teleconferencing, and web-conferencing) on implicit and explicit participation norms in the education, research, and decision-making task groups are discussed.

*Face-to-Face.* The education and research task groups were the only groups that communicated in a face-to-face setting. In face-to-face meetings, the analysis of phase 2 meeting transcript data showed the introduction of explicit process norms within the education and research task groups to facilitate group participation. The analysis also showed that explicit participation norms that developed in the education task group involved discussing who would participate in chairing the group meetings, the meeting participation process, and how the group would participate in the consensus process. For the research task group, the analysis showed that in face-to-face meetings, group members introduced explicit participation norms for chairing the group meeting so that group members were able to participate equally. Members introduced these explicit participation norms into the groups to manage group participation in face-to-face meetings. Combining the education and research task group data using phase 3 post-interview data showed that 6/12 of the respondents commented on the effects of face-to-face communication on group participation. Respondents noted that in face-to-face meetings it was difficult to arrange, and sometimes not feasible; however, it was the preferred method of communication and group members were found to be more active in

the group discussions. Table 9 provides a summary of the participation themes that emerged in both groups.

**Table 9. Education and Research Task Groups: Face-to-Face Participation Norm Themes (Phase 3: Post-Interview Data)**

Participation Norm Themes	Freq(n)
Difficult to Arrange/Not Feasible	4
Preferred Method of Participation	2
More Active Participation	1

*Legend:* Freq (the number of instances occurring in all meetings). *Note:* Respondent (R) #1 was quoted more than once.

A few statements demonstrate the themes discussed in Table 9.

The only [disadvantages] are the time and the cost of travelling to get there. You can't attend in your pyjamas. (Participant (E) #6)

I do prefer face-to-face more just for the human interaction. (Participant (E) #11)

Face-to-face is certainly better than web-conferencing. You can accomplish more in the same time frame. (Participant (R) #1)

In the teleconferencing meeting, it is more difficult to participate when compared to face-to-face. So for someone who phones in one meeting and was more active in a face-to-face meeting, part of that problem is that they just end up being another person on the other end of the phone line. They feel disconnected from the other group members in the room. After about an hour, in a teleconferencing meeting, it takes a lot of energy to try to listen in to what people are saying in the room. (Participant (R) #4)

*Teleconferencing.* An analysis of phase 2 meeting transcript data showed that as the education and decision-making task groups started to use teleconferencing, new explicit participation norms developed. The explicit participation norms that developed for the education task group were discussing who will participate in arranging a chair for

the meeting; ending group participation for the meeting; and waiting for the participation of all individuals before beginning a meeting. For the decision-making task group, the explicit participation norms for live teleconferencing that developed were timing of the meeting and providing times for questions. For the asynchronous decision-making task group meeting, the structure of the meeting was identical to the live teleconferencing meeting and, therefore, a very similar explicit participation norm emerged, such as timing of the meeting. When combining both the education and decision-making task group data using phase 3 post-interviews, 6/12 of respondents made comments on participation within teleconferencing sessions. Respondents noted that live teleconferencing provided the simplest method of participation and, overall, improved group participation by allowing them to participate from anywhere. However, the respondents noted that participation was more anonymous and passive. Concerning pre-recorded teleconferencing, a respondent noted that it provided a convenient method of participation in which a person could listen to the recording at any time. Table 10 provides a summary of teleconferencing participation norm themes for the education and decision-making task groups.

**Table 10. Education and Decision-Making Task Groups: Teleconferencing Participation Norm Themes (Phase 3: Post-Interview Data)**

<b>Participation Norm Themes</b>	<b>Freq (n)</b>
<b>Live Teleconferencing</b>	
Simplest Method for Participation	3
Anonymous Participation	1
Passive Participation	1
Improves Participation	1
<b>Pre-Recorded Teleconferencing</b>	
Convenient	1

*Legend:* Freq (the number of instances occurring in all meetings). *Note:* Respondent (D) #17 was quoted more than once.

Sample statements of the themes shown on Table 10 are provided below.

[Teleconferencing is a] quick, easy tool that is widely available (Participant (E) #7).

With the duration, the sequence of topics, the ability to come in late and leave early without mentioning your name, it creates a sort of an anonymous participation. (Participant (D) #17)

Well, the disadvantage of the recording alone, besides not being able to ask researcher questions, is that there's a psychological thing that happens when you think that this might be your one chance to hear something. You make the effort to go because it may be the one chance. But if you get a recording you can say 'Oh, I can listen to that any time. I'll just put it aside, and I'll get to it later' and you never do. (Participant (D) #17)

It's not very disruptive to your schedule, so that's helpful" (Participant (D) #15).

*Web-conferencing.* Both the education and research task groups used web-conferencing for group communication. Table 11 lists the different implicit and explicit uses of web-conferencing technology by the education and research task groups. The table includes the number of times the web-conferencing features were used during the meetings.

**Table 11. Education and Research Task Groups: Frequency in the Use of Web-conferencing Features to Support Participation Norms (Phase 2: Meeting Transcript Data)**

Implicit/Explicit Participation Norms	Education Task Group		Research Task Group	
	Freq (n)	Mtgs (n)	Freq (n)	Mtgs (n)
Implicit: Hand Raised	45	4/4	10	4/4
Explicit: Restriction on Speaking through Half-Duplex Audio	NA	4/4	NA	4/4
Explicit: Voting/Polling	9	3/4	1	1/4

*Legend:* Freq (the number of instances occurring in all meetings), Mtgs (number of meetings in which the norm occurred), NA (Not Available – could not be quantified).

The results from phase 2 meeting transcript data showed that in web-conferencing meetings, both implicit and explicit participation norms developed for both the education and research task groups. Both groups used hand raising, voting and polling, and restrictions on speaking through half-duplex audio communication.

When the phase 3 post-interview data for both the education and research task groups were combined, the post-interview data showed that 7/12 of the respondents reported effects of web-conferencing on group participation. Respondents stated that it was initially more difficult to participate in web-conferencing meetings because participation required a learning curve to use the technology; however, over time the technology became easier to use. Other respondents discussed the consequences of web-conferencing structure on group participation. Respondents reported that the structure created a democratic approach to participation while other respondents reported that it created a power hierarchy. Table 12 provides a summary of education and research task groups web-conferencing participation norm themes.

**Table 12. Education and Research Task Groups: Web-Conferencing Participation Norm Themes (Phase 3: Post-Interview Data)**

<b>Participation Norm Themes</b>	<b>Freq(n)</b>
<b>Web-conferencing</b>	
Learning Curve Made Participation Difficult	3
Structure Creates Power Hierarchy	3
Structure of Web-Conferencing Created A Democratic Approach to Participation	1

*Legend:* Freq (the number of instances occurring in all meetings).

A few statements demonstrate the themes in Table 12.

It was only the initial introduction of the technology where there was a learning curve, but other than that, I think it was just a learning curve and learning how to

use it because it slightly changed the way you spoke. (Participant (E) #11)

It's not like turning on a computer and you got talking. There are several steps to get up to speed. There's up-time training, and after the training it's fairly descent afterwards. (Participant (R) #1)

Web-conferencing puts [participants] in a hierarchy that they may not be comfortable with. The question is who is on top, who clicks the button to say, 'I listen to you or I don't.' If you have conflict there may be a power issue that can go on and on. Fortunately, that has not happened. (Participant (R) #4)

People who speak louder get to say more. In web-conferencing it does not happen that way. Web-conferencing is more structured and some people think anarchy is more democratic, but I think web-conferencing is more democratic. (Participant (R) #2)

#### ***4.7 Drug Policy Group Processes: Process and Dissemination Facilitation in Face-to-Face, Teleconferencing, and Web-conferencing meetings***

In this section, the results for the process facilitator and the dissemination facilitator for the education, research, and decision-making task groups are discussed.

##### ***4.7.1 Face-to-Face Process Facilitation Functions within the Education and Research Task Groups***

Table 13 provides a summary of face-to-face process facilitation results for the education and research task groups using phase 2 meeting transcript data. The analysis of meeting transcripts, for both the education and research task groups, showed that the process facilitator was involved in process facilitation functions and not process

dissemination functions. Furthermore, the data showed that the facilitator was not detached from the meetings, but was an active member involved in group discussions.

**Table 13. Education and Research Task Groups: Face-to-Face Process Facilitation Functions and Involvement (Phase 2: Meeting Transcript Data)**

	<b>Education Task Group Freq(n)</b>	<b>Research Task Group Freq (n)</b>
<b>Process Facilitation Functions</b>		
Guides Participants through Meeting	18	14
Encourages Individual or Group Participation	11	7
Changes or Skips Agenda Items	3	0
Builds Group Consensus	0	2
<b>Facilitator Involvement in Group Discussion</b>		
Involved in Group Discussion	21	17
Asks Group Members Questions	7	6
Thanks Person When Speaking	7	1
Discusses Future Meetings	5	0
Provides Reflection on Group Discussions	1	0

*Legend:* Freq (the number of instances occurring in all meetings).

No comments from the phase 3 post-interviews were generated on face-to-face process facilitation for both groups.

#### ***4.7.2 Teleconferencing Process and Dissemination Facilitation Functions within the Education and Decision-Making Task Groups***

Teleconferencing was used only in the education and decision-making task groups. Phase 2 meeting transcript data showed that for the education task group, the role of the facilitator was to facilitate group processes. However, for the decision-making task group, the facilitator needed to fulfill two roles: a chair to facilitate process and a facilitator to disseminate research. Reporting of the results was not combined for this section because of the differences in facilitator functions within each group.

*Education Task Group Teleconferencing Results.* Table 14 describes the process facilitator functions and their involvement within the education task group. Phase 2 meeting transcript data shows that the facilitator for the education task group was involved in process facilitation functions as well participating as an active member within the group. The process facilitator was not involved in the dissemination of information.

**Table 14. Education Task Group: Teleconferencing Process Facilitation Functions (Phase 2: Meeting Transcript Data)**

	<b>Education Task Group</b>	
	Freq	Mtgs
<b>Process Facilitation Functions</b>		
Encourages Individual or Group Member Participation	33	4/4
Guides Participants through Presentation/Meeting	23	4/4
Changes or Skips Agenda	1	1/4
<b>Facilitator Involvement in Group Discussion</b>		
Asks Group Members Questions	28	4
Delegates Tasks	10	3/4
Discusses Future Meetings	9	3/4
Greets Participants	6	1/4
Queries Group Who is Present	1	1/4

*Legend:* Freq (the number of instances occurring in all meetings), Mtgs (number of meetings in which the theme occurred).

*Decision-Making Task Group Teleconferencing Results.* The results below describe the dissemination and process facilitator functions within the decision-making task group. In sum, the data shows that within the teleconferencing meetings, the facilitator was primarily involved in the dissemination of research findings within the meeting. Furthermore, it shows that the process facilitator was active; however, as described earlier, process facilitation functions were primarily used at the beginning and the end of the meeting. The data includes both the live and pre-recorded teleconferencing results. Table 15 summarizes the results.

**Table 15. Decision-Making Task Group: Teleconferencing Dissemination Facilitation and Process Facilitation Functions (Phase 2: Meeting Transcript Data)**

	<b>Decision-Making Task Group</b>	
	Freq	Mtgs
<b>Process Facilitation Functions</b>		
Encourages Questions	10	6/6
Introduces the Presenter	6	6/6
Greets Group Members	7	6/6
<b>Research Dissemination Process</b>		
Talks about Limitations of Research	15	4/6
Uses Plain Language in Presenting Results	NA	6/6
Makes Research Relevant to Decision-making	10	6/6
Uses Graphics in Presentation	NA	6/6
Key Messages Presented Up Front	NA	6/6
Uses Humour in Presentation	0	0

*Legend:* Freq (the number of instances occurring in all meetings), Mtgs (number of meetings in which the theme occurred), NA (Not Available – could not be quantified).

Using phase 3 post-interview data, one respondent commented on the limited role of the process facilitator within the decision-making task group: “You don’t have to over-facilitate those teleconference calls. You just let people join and then sign off when they’re done listening” (Participant (D) #16).

#### ***4.7.3 Web-Conferencing Process Facilitation Functions within the Education and Research Task Groups***

Based on phase 2 meeting transcript data, Table 16 shows the process facilitator functions and the facilitator’s level of involvement in group discussions within both the education and research task groups. No dissemination facilitation functions were present in either group.

**Table 16. Education and Research Task Groups: Web-Conferencing Facilitator Functions (Phase 2: Meeting Transcript Data)**

	Education Task Group		Research Task Group	
	Freq	Mtgs	Freq	Mtgs
<b>Process Facilitation Functions</b>				
Encourages Individual or Group Participation	78	4/4	31	4/4
Guides Participants through Presentation	64	4/4	21	4/4
Proposes Technology Use	31	2/4	14	4/4
Trouble Shoots Communication Problems	11	4/4	7	4/4
Changes or Skips Agenda Items	1	1/4	2	2/4
Explains Technology Use	0	0/4	9	4/4
<b>Facilitator Involvement in Group Discussion</b>				
Asks Group Members Questions	44	4/4	25	4/4
Discusses Future Meetings	20	2/4	5	3/4
Thanks Person After Speaking	10	3/4	28	4/4
Delegates Tasks	4	3/4	8	3/4

*Legend:* Freq (the number of instances occurring in all meetings), Mtgs (number of meetings in which the theme occurred), NA (Not Available – could not be quantified).

In the combined phase 3 post-interview results for both the education and research task groups, 8/12 of the respondents commented on the effects of web-conferencing on the facilitator functions. The respondents noted that collaboration and distinct roles were needed for process and technical facilitators; that it was easier to facilitate in web-conferencing than face-to-face; that the process facilitator needed more awareness of participants; that the process facilitator needed strong facilitation skills; that the process facilitator felt detached from the technology-enabled meetings; and that the process facilitator had more control in web-conferencing meetings. Table 17 provides a summary of the themes for the facilitator function in web-conferencing meetings.

**Table 17. Education and Research Task Groups: Web-Conferencing Facilitator Role Themes (Phase 3: Post-Interview Data)**

<b>Process and Technical Facilitation Functions</b>	<b>Freq(n)</b>
Collaboration and Distinct Roles Needed for Process and Technical Facilitator	3
Process Facilitator Needs Strong Facilitation Skills	2
Web-conferencing Provides Greater Meeting Control to Facilitator	2
Process Facilitator Needs to be More Aware of Participants	2
Process Facilitator Feels Detached from Meeting	1
Easier to Facilitate in Web-Conferencing	1

*Legend:* Freq (the number of instances occurring in all meetings) Note: Respondent (R) #5 was quoted four times.

Statements from respondents demonstrate the themes shown in Table 17.

There's a need for a technical and process facilitator. There might be an advantage with the technology to have a distinction between the two (Participant (E) #12).

I think in the face-to-face meetings, there are different kinds of cues that the facilitator can use, including visual cues, body language, etc. Whereas on the web-conferencing, you lose visual cues, but there are certain types of electronic ways to try and capture that. So on web-conferencing, the facilitator has to be a lot more conscious about the lack of cues. (Participant (R) #1)

When our face-to-face meetings were not disciplined, moving to web-conferencing made it more disciplined. The web-conference is always more structured, but with the facilitator and the control that they imposed in the group, there was more discipline in the meetings. (Participant (R) #12)

The facilitator needs to be more aware of the need to check with other people. This will help make sure everybody is included. They should not move on to the next item until they checked that all discussions are finished for that item. (Participant (E) #6)

When it was teleconferencing, you almost had to go coast to coast asking for comments. Where with the raising of the hands function in web-conferencing and various things like that, the conversation went much smoother. As a facilitator, it was much easier to see who is in attendance, who wants to speak next, who's voting for what, etc. From a facilitation point of view, it was excellent.  
(Participant (E) #9)

#### ***4.8 Drug Policy Group Processes: Information Exchange Processes in Face-to-Face, Teleconferencing, and Web-Conferencing Meetings***

This section discusses the mode of communication, method of communication, and the type of evidence shared in information exchange. The method of communication was face-to-face, teleconferencing, or web-conferencing. The mode of communication was oral, via PowerPoint, text messaging, whiteboard, or application sharing. The type of evidence shared was group members discussing their own research results, personal opinion, personal work experience, references to external literature, colleagues' work experience, or task related discussions.

##### ***4.8.1 Effects of Face-to-Face Meetings on Education and Research Task Group Information Exchange Processes***

Table 18 summarizes the effects of face-to-face meetings on the level of evidence in the education and research task groups, based on phase 2 meeting transcript data. The data shows that much of the discussions for both the education and research task groups were primarily task focused.

**Table 18. Education and Research Task Groups: Level of Evidence Shared in Face-to-Face Meetings (Phase 2: Meeting transcript data)**

Level of Evidence	Education Task Group	Research Task Group
	Freq (n)	Freq (n)
Task Related Discussions	22	58
Personal Experience	15	14
Personal Opinion	14	1
Colleagues Work Experience	12	5
Reference to External Literature	5	1
Data from the Participants Own Research Experience	0	1

*Legend:* Freq (the number of instances occurring in all meetings). *Note:* Only one sample meeting took place for each group. Therefore, the number of occurrences per meeting is not included because the data above represents one meeting.

No respondents commented from the phase 3 post-interviews on information exchange in face-to-face meetings.

#### **4.8.2 Effects of Teleconferencing on Education and Decision-Making Task Group**

##### **Information Exchange Processes**

Table 19 provides a summary of the information exchange level of evidence used in teleconferencing for both the education and the decision-making task groups based on phase 2 meeting transcript data. The results of phase 2 meeting data for each group are presented separately because of the differences in results and research tasks.

**Table 19. Education and Decision-Making Task Groups: Level of Evidence Shared in Teleconferencing Meetings (Phase 2: Meeting transcript data)**

Level of Evidence	Education Task Group		Decision-Making Task Group	
	Freq	Mtgs	Freq	Mtgs
Task Related Discussions	55	4/4	0	0/7
Personal Experience	9	3/4	14	6/7
Reference to External Literature	5	2/4	6	5/7
Colleagues Work Experience	4	2/4	1	1/7
Data from the Participants Own Research Experience	2	1/4	10	7/7
Personal Opinion	1	1/4	15	7/7

*Legend:* Freq (the number of instances occurring in all meetings), Mtgs (number of meetings in which the

theme occurred).

*Education Task Group.* The education task group used teleconferencing as a mode for communication. E-mail and PowerPoint slides were the methods of communication used for information sharing in teleconferencing meetings. In teleconferencing sessions, phase 2 meeting transcript data shows that most of the group discussions for the education task group were task related and non-evidence based.

No data were reported from the phase 3 post-interviews on information exchange in teleconferencing sessions. Only the decision-making task group commented on the effects of teleconferencing on the information exchange process.

*Decision-Making Task Group.* For the decision-making task group, the mode of communication included two teleconferencing modes: live teleconferencing (synchronous) and pre-recorded teleconferencing (asynchronous). The method of communication for synchronous or live meetings was primarily oral with the distribution of electronic PowerPoint slides via e-mail prior to the meetings. Asynchronous or pre-recorded meetings were sent via e-mail along with PowerPoint slides and a recording of the meeting.

Within the decision-making task group, 5/5 of the respondents discussed the effects of teleconferencing on the information exchange process. In general, respondents noted that teleconferencing changed the nature and credibility of the evidence; that the structure of the presentation limited the amount of information shared and reduced flexibility in presentation; and that teleconferencing was useful for sharing information but had little influence on the decision-making process. See Table 20 for a summary of

the effects of teleconferencing on the information exchange process within the decision-making task group.

**Table 20. Decision-Making Task Group: Teleconferencing Information Exchange Themes (Phase 3: Post-Interview Data)**

<b>Information Exchange Process</b>	<b>Freq (n)</b>
Teleconferencing Useful for Sharing Information but has Little Effect on Decision-making	3
Structure of the Presentation Limited the Amount of Information Shared and Reduced Flexibility in the Presentation	2
Live vs. Pre-recorded Teleconferencing Effects on the Credibility of the Evidence	2
PowerPoint Changes the Nature of the Evidence	1

*Legend:* Freq (the number of instances occurring in all meetings). *Note:* Respondent (D) #14, Respondent (D) #15, and Respondent (D) #17 were quoted more than once.

Statements from the respondents in relation to the themes outlined in Table 20 are presented below.

I don't think anyone that would have participated in those sessions would have just taken the information and gone away and said that this was gospel. We are all used to critiquing the literature and looking at methodology. To me, it was an alert that there's this piece of work out there that's been done or someone is in the process of doing, and the results will be available six months down the road or it will be published, and it's relevant to what you're doing. (Participant (D) #15)

Narrowing down the presentation to 10 minutes is not typical in academic presentations. This process forced [the presenter] to narrow down their research to the most important findings" (Participant (D) #13).

I guess I would prefer the pre-recorded teleconferencing meeting because there would be less off-the-cuff discussion. Say the pre-recorded thing is a researcher presenting the results of a study; it's essentially a published source. Whereas with a live broadcast, people make mistakes when they talk. Sometimes they use one

word when they mean to use another word, or maybe when a discussion ensues, you lose track of what's the official presentation of the research study and what was just speculation. (Participant (D) #14)

I think PowerPoint would effect information sharing in two respects. One it can be presented at too high a level for the content. Generally speaking, these are research studies that are in-depth, and PowerPoint essentially provides a good introduction of the subject, but to give it a really thorough presentation, it should be followed up with the actual detailed study. (Participant (D) #14)

#### ***4.8.3 Effects of Web-Conferencing on Education and Research Task Group Information Exchange Processes***

Table 21 provides a summary of the effects of web-conferencing on the level of evidence for both the education and the research task groups, using phase 2 meeting transcript data. The data shows that most of the information exchange was primarily task related and non-evidence based for both the education and research task group.

**Table 21. Education and Research Task Group: Level of Evidence Shared in Web-conferencing Meetings (Phase 2: Meeting transcript data)**

Level of Evidence	Education Task Group		Research Task Group	
	Freq	Mtgs	Freq	Mtgs
Task Related Discussions	137	4/4	93	4/4
Personal Opinion	16	4/4	7	3/4
Personal Experience	6	4/4	5	1/4
Colleagues Work Experience	3	1/4	5	2/4
Reference to External Literature	1	1/4	1	1/4
Data from the Participants Own Research Experience	0	0/4	0	0/4

*Legend:* Freq (the number of instances occurring in all meetings), Mtgs (number of meetings in which the theme occurred).

When combining the phase 3 post-interview data for both the education and research task groups, 8/12 of the respondents commented on the consequences of web-conferencing on the information exchange process. The respondents noted that web-conferencing had little influence on evidence; however, it did affect how the evidence was shared. As well, respondents noted that web-conferencing limited the amount of information that could be displayed on the whiteboard, but helped group members follow, look at, and point to the information needed. Table 22 summarizes the effects of web-conferencing on the information exchange process within the education and research task groups in the form of themes.

**Table 22. Education and Research Task Groups: Web-Conferencing Information Exchange Themes (Phase 3: Post-Interview Data)**

<b>Information Exchange Process</b>	<b>Freq(n)</b>
Web-Conferencing Had Little Effect On Level of Evidence	3
Web-Conferencing Did Affect How Evidence Was Shared	2
Web-Conferencing Helped Group Members Follow, Look At, and Point to the Information Presented	3
Web-Conferencing Limited the Amount of Information that Could Be Displayed	2

*Legend:* Freq (the number of instances occurring in all meetings). *Note:* Respondent (E) #8 and Respondent (E) #9 were quoted more than once.

A few sample statements reflect the information presented in Table 22.

We're all pretty much evidence based people, and I don't think anybody would explicitly disagree [that web-conferencing affected the level of evidence].  
(Participant (E) #6)

No, I think the level of evidence we discussed still stayed the same. (Participant (E) #9)

Teleconferencing was far more one-dimensional. It was just bringing up a study based on the name. Where the web-conferencing allowed for [the group to share]

a number of articles which allowed for a much more efficient summarization of the information. (Participant (E) #9)

Web-conferencing helped to facilitate a person being able to share information, making sure everybody was on the same page so that people don't get lost (Participant (E) #8).

In a face-to-face meeting they have materials and articles in front of them, and it is easier for them to reference the articles because they can see what others are referencing. As a chair, you don't know if they are looking at the right one or not. You can ask them, but you are still not sure if they are or not. In web-conferencing at least you can ensure they are looking at the same material. (Participant (R) #4)

The PowerPoint enabled pretty complex ideas to be presented like the group organizational process. There was this circular flow diagram with different loops and several organizations. It would have been impossible or much less easy to talk about if it wasn't on the screen. It is much easier to talk about because I can point the cursor towards the screen. (Participant (R) #12)

With an academic detailer who has detailed information, they would feel web-conferencing as an impediment to sharing detailed information with other group members. In the future, I can imagine either larger screens or pairs of screens where they are looking at the entire document. Then technology would be better if you could see a full page document plus all of the web-conferencing features. (Participant (E) #12)

The following section of the chapter discusses the output survey results for the education, research, and decision-making task groups.

#### ***4.9 Drug Policy Outputs: Education, Research, and Decision-Making Task Group Survey Results***

As described in the methods section, surveys were distributed via e-mail to all eligible group participants at all three drug policy groups. The questions focused on TELE outputs and required the participants to rate their satisfaction with information sharing, group interactions, cohesion, trust building, conflict, and group facilitation (See Appendix 4 for questionnaire). The participants were asked to rate each of these on a scale from 1-5 as follows: 1 = very ineffective, 2 = somewhat ineffective, 3 = neutral, 4 = somewhat effective, 5 = very effective. See Appendix 4 for post-study survey questionnaire for the drug policy groups. In tables Table 23, Table 24, and Table 25, information sharing, interactions, cohesion, trust, conflict, and facilitation for each communication media are the averages of individual responses to the survey questions. At the bottom of the tables, the average of group responses for the group across all outputs is provided. The averages have a maximum score of 5.

##### ***4.9.1 Education Task Group Survey Results***

The education task group respondents were asked six questions about linkage and exchange outputs. In general, results show that the most preferred method for linkage and exchange meetings was face-to-face when all ratings were averaged. Face-to-face had an average of 4.5, web-conferencing 3.9, and teleconferencing 3.6. In general, across all of the six categories, teleconferencing had the lowest ratings for information sharing, interaction, cohesion, trust, conflict, and facilitation while face-to-face had the highest.

Web-conferencing was rated in the middle between teleconferencing and face-to-face.

Table 23 summarizes the data for the education task group outputs.

**Table 23. Education Task Group Outputs**

<b>Outputs</b>	<b>Tele</b>	<b>Web</b>	<b>F-F</b>
Information Sharing	3.8	4.0	4.5
Interactions	4.0	4.3	4.8
Cohesion	3.5	4.0	4.0
Trust	3.5	3.8	4.3
Conflict	3.5	3.5	4.8
Facilitation	3.5	4.0	4.5
<b>Average</b>	<b>3.6</b>	<b>3.9</b>	<b>4.5</b>

*Legend:* Tele (Teleconferencing), Web (Web-conferencing), F-F (face-to-face).

#### **4.9.2 Research Task Group Survey Results**

The research task group respondents were asked six questions relating to linkage and exchange outputs. In general, results show that face-to-face was the preferred method of communication when all ratings were averaged. Face-to-face had an average of 4.4, and web-conferencing an average of 3.6. In general, across all of the six categories, face-to-face had the highest ratings for information sharing, interaction, cohesion, trust, conflict, and facilitation. Table 24 summarizes the data.

**Table 24. Research Task Group Outputs**

<b>Outputs</b>	<b>Web</b>	<b>F-F</b>
Information Sharing	4	4
Interactions	3	5
Cohesion	4	4
Trust	3.8	4.3
Conflict	4	4
Facilitation	3	5
<b>Average</b>	<b>3.6</b>	<b>4.4</b>

*Legend:* Tele (Teleconferencing), F-F (Face-to-Face).

#### **4.9.3 Decision-Making Task Group Survey Results**

The decision-making task group participants were asked six questions relating to a comparison of the linkage and exchange outputs in the live and pre-recorded sessions.

In general, results show that the live teleconferencing was the preferred method of communication when all linkage and exchange ratings were averaged. The live teleconferencing had an average of 4, and the pre-recorded an average of 3. In general, across all of the six categories, the live teleconferencing meetings had the highest ratings for information sharing, interaction, cohesion, trust, conflict, and facilitation. Table 25 summarizes the data.

**Table 25. Decision-Making Task Group Outputs**

<b>Outputs</b>	<b>Live</b>	<b>Pre</b>
Information Sharing	4.3	4
Interactions	4	3
Cohesion	4	3
Trust	4.17	3
Conflict	3.17	2
Facilitation	4.12	3
<b>Average</b>	<b>4</b>	<b>3</b>

*Legend:* Live (Live Teleconferencing), Pre (Pre-Recorded Teleconferencing).

In summary, for the education and research task groups, the results show that face-to-face meetings were the preferred method for carrying out linkage and exchange activities. Face-to-face meetings were followed by web-conferencing for both the education task and research task groups. The least preferred method of communication for the education task group was teleconferencing. The decision-making task group preferred live teleconferencing sessions over pre-recorded sessions for carrying out linkage and exchange activities.

#### **4.10 Chapter Summary**

The chapter presents a description and analysis of linkage and exchange inputs, processes, and outputs as they were described in the conceptual framework. The inputs described in the chapter were group characteristics, communication media, research

tasks, context, and culture of the three drug policy groups. The chapter also presents an in-depth analysis of linkage and exchange processes (social interaction, facilitation, and information exchange) for the three drug policy groups as they occurred in face-to-face, teleconferencing, and web-conferencing meetings. Respondent perceptions on communication media (face-to-face, teleconferencing, and web-conferencing) were compared and discussed. Finally, the analysis of group outputs was discussed. The following chapter consolidates the results into high-level findings and provides a discussion of the research and practical implications of the study as well as the study limitations.

## Chapter 5: Discussion

The previous chapter discussed the results of the research. In this chapter, the results are consolidated into high-level findings, providing a discussion of the research and its practical implications. In addition, here the research questions are answered and related to previous literature. We conclude with a discussion of the limitations of the study.

### *5.1 Findings for Social Interaction Norms*

This section provides the findings of the social interaction norms that emerged within the study.

***Finding 1: Groups developed different discussion and participation norms within different communications media.***

This finding applies to the education and research task groups, where both groups experienced changes in social interaction norms when communicating in face-to-face, teleconferencing, and web-conferencing. For example, in face-to-face meetings, both the researcher and education task groups introduced explicit norms to control group discussions. The discussion norms were introduced to ensure that meeting discussions did not exceed the allotted time. When both the education and research task groups started to use web-conferencing, the technology limited their communication, allowing only one person to speak at a time. The groups implicitly started to introduce other forms for communication, such as text messaging, voting and polling, emoticons, and application sharing, to enhance the group discussions. These new discussion norms were introduced to compensate for the loss of immediacy and spontaneity in group discussion when moving from face-to-face to web-conferencing interactions.

For group participation in face-to-face meetings, both the education and research task groups introduced participation norms to moderate the groups' participation processes. For example, the education and research task groups introduced an explicit participation norm for chairing that would enable group members to participate equally. When moving to web-conferencing, the structure imposed by the technology created new meeting participation processes. For example, the hand-raising function required to participate via voice.

This finding agrees with predictions of the theory of adaptive structuration (AST) developed by DeSanctis and Poole (1994). According to AST, the use of ICT introduces structures that influence the rules and resources that govern social interactions. Within both the education and research task groups, new forms of explicit and implicit interaction norms were introduced to moderate the influence of technology on group social interactions. This finding validates the need to include communication media as an input in the conceptual framework because the media affect group participation and discussion processes.

***Finding 2: The rigid communication structures of web-conferencing forced group members to introduce other tools for communication.***

Within the education and research task groups, web-conferencing allowed only one person to speak at a time. As a result, the research task group respondents found that this rigid approach to communication within web-conferencing dampened socio-emotional interactions. Within the education task group, respondents noted that this limitation restricted group discussions; for example, it made it difficult to interrupt the speaker.

Because of these limitations on voice communication in web-conferencing meetings, the education and research task groups used text messaging in the meetings for asking questions, troubleshooting, and communicating generally; as well, group members used emoticons to express laughter and applause. This demonstrated that when encountering a highly structured approach to communication, the group members resorted to other forms of communication to compensate for the lack of socio-emotional interactions found in web-conferencing.

An explanation may be that as the education and research task groups moved from unstructured communication type environments (i.e., face-to-face or teleconferencing) to the highly structured web-conferencing, the dynamics of group communication changed. With web-conferencing, group members could communicate only via voice, one person at a time using the hand raising function. The groups compensated for this loss of immediacy in communication by adapting and introducing new methods and structures for communication. Group members started to use text messaging and emoticons as a way to improve group socio-emotional interactions. This supports what Adaptive Structuration Theory (AST) predicts: groups will adapt to technology structures as these structures become part of their culture of communication.

Because the communication structure of the technology affected the group social interaction process, it will be added as an input in the conceptual framework for linkage and exchange. Communication structure refers to the degree of flexibility the technology allows for group members to speak freely within a meeting. In considering web-conferencing, for example, communication structure could be operationalized based on the structures the technology provides, which are half-duplex and full-duplex.

***Finding 3: Group discussions were perceived as best in face-to-face meetings and as worst in teleconferencing meetings.***

Within the education and research task groups, face-to-face meetings were perceived as the most conducive structure for group discussions. Discussions were richer due to non-verbal communication, more spontaneous due to free flowing discussions, and more immediate with regard to responses to group discussion. During teleconferencing meetings, discussions were perceived to be not as rich because no non-verbal cues could be shared. However, the discussions in teleconferencing meetings were found to be similar in immediacy and spontaneity to face-to-face meetings. Web-conferencing was perceived to be a richer form of communication than teleconferencing because group members could use emoticons, voting and polling, whiteboard, and text messaging. However, the groups found that web-conferencing reduced spontaneity and immediacy of discussions.

The experience of this researcher with the groups and the study findings suggests that if group members had been co-located and if a budget had supported group travel, face-to-face would have been the preferred communication media with little or no use of teleconferencing or web-conferencing. In fact, this occurred in the research task group, where group members resorted to face-to-face meetings and discontinued web-conferencing meetings because most group members were co-located and a budget supported travel. However, in the education task group, because of the costs and the time required to travel, different forms of communication, such as teleconferencing and web-conferencing, were considered necessary to facilitate group meetings.

This finding can be explained by the literature on social presence. Social presence is defined as “those communication behaviours that enhance the closeness to, and non-verbal interaction with, each other” (Mehrabian, cited in Rourke et al., 2001). The concept of social presence suggests that a higher degree of interaction between individuals materializes with a greater presence of non-verbal cues, body movement, and eye contact, which increase sensory stimulation (Mehrabian, cited. in Rourke et al., 2001). Such high-level interactions are found primarily in face-to-face interactions. According to the study results, both the education and research task groups preferred meeting face-to-face because of the groups’ preference for a higher degree of interaction. However, due to budget and geographical constraints, the education task group communicated via teleconferencing and web-conferencing, whereas the research task group, not affected by the same constraints, was able to meet face-to-face.

With regard to implications for the conceptual framework, this finding demonstrates that drug policy groups prefer meeting face-to-face because of higher social presence. As the group interaction moves from a communication medium of high social presence (face-to-face) to one with a low social presence (teleconferencing), this shift may affect the relationship-building process that is important for a successful linkage and exchange process.

The social presence of the communication medium is a category that will be added to the inputs within the conceptual framework. Social presence should be operationalized based on the richness the communication media provides, for example, high (in face-to-face), medium (in web-conferencing), and low (in teleconferencing).

***Finding 4: Teleconferencing provided the most convenient method for participation.***

Respondents noted that teleconferencing had the advantage of making the participation process easy and convenient. The teleconferencing platform provided a very simple process for enabling participation since all participants had access to and were familiar with the technology. The participant simply called a number and entered a meeting code to participate in the meeting. In face-to-face meetings, participants had to arrange for travel, which took time and financial resources. Therefore, participation in face-to-face meetings was the most difficult for geographically dispersed groups. In web-conferencing, it was more difficult to participate than in teleconferencing, but less difficult to participate in than face-to-face. In web-conferencing the user needed a computer, a microphone, software, and skill in using the applications to participate in the meeting. As the education and research task groups noted, members needed to learn how to use the equipment before participating in the web-conference.

***Finding 5: Web-conferencing was the most effective method to facilitate linkage and exchange for groups that had limited budgets, were geographically dispersed, and highly collaborative.***

The evidence suggests that web-conferencing is the best choice to facilitate linkage and exchange given limited budgets, geographic dispersion, and a need for a high level of collaboration. The education task group was able to tolerate the learning and the highly structured communication process required to use web-conferencing because the group had a limited budget, was geographically dispersed, and was highly collaborative. However, the research task group had a budget to support travel; its members were co-

located and highly collaborative. Therefore, the research task group was not interested in web-conferencing meetings because they had the resources to meet face-to-face.

The decision-making task group had a limited budget, were geographically dispersed, and were not highly collaborative. Such a group may not have tolerated web-conferencing. In the study, it was observed that decision-makers in drug policy were too busy to learn a new technology such as web-conferencing. For this group, live teleconferencing meetings were the preferred method of communication.

These results are similar to those Orlikowski and Yates (1994) found in their study of technology-enabled computer language designers collaborating on a multi-year project involving development of various programming languages. The authors found that different group inputs affected how the groups chose to communicate with each other. Over time, the group reinforced the pattern of how they communicated with each other until the technology they chose became the main method with which group members worked with each other.

***Finding 6: Web-conferencing forces group interaction “within the text.”***

Education and research task group members noted that when group members started to use web-conferencing, their interactions changed from interacting with each other to interacting within the text. For example, when the education or research task groups met face-to-face, group members would face each other directly and share the same space. In web-conferencing, however, the agenda would be placed on the whiteboard for all to see. All members would interact with and talk about the agenda placed on the whiteboard. The whiteboard itself represented the shared space, whereas in face-to-face meetings the shared space was the office or room. Group interactions within

web-conferencing were structured around the text, and the documents were shared on the whiteboard.

Cramton (2001, 2002) conducted studies on the effects of text-based interactions on group communication. In the studies of a performance appraisal system design firm, the author observed that due to the absence of non-verbal cues in e-mail messages, group members did not pay attention to certain messages embedded within the e-mail. The author notes that text-based interactions, especially e-mail communication, can lead to group members missing messages embedded within the text. Even though Cramton's (2001, 2002) study focused on e-mail messages, it is important to note the potential ramifications of text-based interactions with regard to how information is processed by group members. The potential implication for linkage and exchange is that pieces of information may be missed or misinterpreted by decision-makers or researchers.

## ***5.2 Findings for Facilitation***

### ***Finding 7: More technological features required more effort from the facilitator.***

The analysis suggested that as the groups moved from face-to-face to using technology, more effort was required from the facilitator to facilitate the meetings. For example, as both the education and research task groups moved from face-to-face meetings to web-conferencing meetings, new processes and structures were introduced into the meetings. The facilitation process needed two enablers instead of one: a process facilitator and a technology facilitator. With face-to-face meetings, only one process facilitator was needed to assist in the group process.

In the literature review, the two roles of the facilitator—one that facilitates process and another that facilitates the use of technology—were discussed (Clawson,

Bostrom, & Anson, 1993; Dickson, Partridge, & Robinson, 1993). The literature review also noted two perspectives on the role of facilitation: the effects of facilitators on the group process and the effects of technology on the facilitation process (Dickson, Partridge, & Robinson, 1993). Web-conferencing technology had a strong effect on the facilitation process because the process facilitators did not merely facilitate the process; they were also active members within the groups. Therefore, becoming involved in group discussions and facilitating the group process made it difficult for the process facilitator to manage the technical facilitation aspects of the meeting. A technical facilitator was needed to help with any technical issues that hindered the group communication process, such as a technological breakdown or the inability of members to use the technology. Teleconferencing had no need for a technical facilitator because teleconferencing was familiar to users, easy to use, and had limited technological features. Overall, it is important to include two facilitators in web-conferencing meetings to minimize the chance of a breakdown of the linkage and exchange process. Within the conceptual framework, the technical facilitation function will be added as a new process for facilitation.

***Finding 8: Facilitator control of meetings was highest in web-conferencing meetings.***

Study results show that the process facilitator had a high degree of control over group discussions within web-conferencing meetings. One respondent noted that the meeting structure helped create a more equalized participatory or democratic process while another noted that the highly defined structure did not create an environment conducive to linkage and exchange. For the research task group, the facilitator had considerable control over group discussions because group members needed permission

from the facilitator to speak. As a result, the research task group respondents were not satisfied with the high level of facilitator control. With the education task group, the issue of allowing the facilitator such control did not arise.

Differences in facilitator roles may have been a reason for the differences in perspectives on facilitator control within web-conferencing meetings. In the research task group, a designated process facilitator was assigned to facilitate group meetings. The structure and control of the designated process facilitator over group discussions was not seen favourably within the group. However, within the education task group, the group implemented a rotating process facilitation function wherein each participant had the opportunity to facilitate a meeting. Therefore, the facilitation control was shared equally between education task group members; in the research task group, the process facilitation function was controlled by one individual. This may explain the differences in perception with regard to the facilitator's control of the meetings.

***Finding 9: Disseminating research required little or no process facilitation expertise.***

Since the main task of the decision-making task group was to disseminate research knowledge, the dissemination facilitator was more involved in the group than was the process facilitator. The findings indicate that the involvement of the process facilitator for the decision-making task group was very low; he or she greeted participants and moderated the question and answer period. However, the dissemination facilitator played the largest role within the decision-making task group. Most of the dissemination facilitator's time was dedicated to the presentation of research. Therefore, it is important that the dissemination facilitator focus primarily on disseminating research and not focus on the process facilitation function. The focus of the dissemination facilitator should be to

ensure that the research presentations are interesting, appealing, and informative to the audience (CHSRF, 2000). The process facilitator should introduce the speaker, ask members of the audience to introduce themselves, and moderate the question and answer period, as the process facilitator did in the decision-making task group (CHSRF, 2000).

***Finding 10: Process facilitation skills are vital to the success of the linkage and exchange process.***

In the analysis, group members noted that process facilitation skills were vital to the success of linkage and exchange meetings. The process facilitators played an important role within the education and research task groups; they managed the group discussion and participation process. Without such guidance, the linkage and exchange process would have likely failed. When moving from a non-verbal rich medium, such as face-to-face, to a less rich non-verbal medium, such as web-conferencing, the facilitator needs to have strong facilitation skills to engage participants effectively.

In a study on the effects of trained facilitators on group processes, Anson, Bostrom, and Wayne (1995) noted that process facilitation is a critical factor for improving group meetings in a technology-enabled environment. They noted that higher quality process facilitation improves the meeting process and training and that experience is important to building high quality process facilitation skills.

### ***5.3 Findings for Information Exchange***

This following discussion provides information on the findings relating to information exchange.

***Finding 11: Technology and presentation structure had a strong effect on information sharing, but little on evidence.***

The post-interview and meeting transcript data suggest that respondents in the education and research task groups believed that technology had little effect on the level of evidence shared in the group. A possible explanation for this finding is that the group had arranged the documents (PowerPoint slides and PDF documents) to share before the meeting. Because they had pre-arranged the presentation of the evidence independently of the technology, the groups perceived that the technology had no real effect on the level of evidence.

Even though respondents noted that technology did not affect the strength of the evidence, they acknowledged that technology did affect how the evidence was shared within the group. For example, respondents noted that web-conferencing limited the amount of information that a member could share on the whiteboard, which forced the group to summarize the information for display on the computer screen.

In general, the ICT literature on information exchange has focused on types of information (i.e., task information, social information, and contextual information), distribution of information, information sharing challenges, and general effects of technology on information sharing (Cramton & Ovis, 2003). Only a nominal amount of literature discusses the effects of technology on the level of evidence and how information is shared.

***Finding 12: The research task had the strongest effect on the level of evidence within the group.***

The research task had the strongest effect on the level of evidence within the drug policy groups. For example, the education and research task groups were working on collaborative research evaluation tasks. Therefore, most of the discussions within the groups were task-based and focused little on evidence sharing. However, in the decision-making task group, the group task was to disseminate research information. Therefore, most of the group discussions were evidence-based.

With regard to the conceptual framework, it is important to note that the research task plays a large role on the consequences of evidence sharing within a group. Technology has a smaller influence on the level of evidence, but has a larger effect on how the information is shared.

#### ***5.4 Research Implications***

The analysis of the data demonstrate that information and communication technologies had an effect on linkage and exchange processes (social interaction, facilitation, and information exchange) within drug policy groups. These findings are limited to linkage and exchange inputs, processes, and outputs described in the conceptual framework. Future studies should explore the effects of ICT on knowledge exchange and knowledge translation activities and processes relating to collaborative problem solving, synthesizing evidence, contextualizing evidence, and applying evidence. Future investigators should also study multiple groups in different health domains that involve researchers and decision-makers, using both the current ICT used in the present study and other technologies, including videoconferencing and group decision

support systems. Future researchers should use the TELE conceptual framework as an initial starting point and then try to develop it further by applying the framework to different health domains, refining it into a model. More refinement is needed, and this will happen when the framework is applied to other groups and settings.

Three research questions were posed at the beginning of the research study. Each of these research questions is addressed below.

***1) Does ICT have an effect on linkage and exchange processes within drug policy groups?***

The analysis and findings in this study show that technology affects social interaction norms, facilitation processes, and information exchange processes. For example, as groups started to incorporate technologies, new participation and discussion norms developed within the groups. In web-conferencing meetings, a technical facilitator was needed to help the process facilitator in managing group interactions. Within web-conferencing and teleconferencing meetings, the process facilitator had to be especially aware of and able to engage a distant audience. With information exchange, technology was found not to affect the level of evidence; instead, technology affected how the information was shared.

More specifically, the findings regarding social interaction norms suggest that: 1) groups develop different discussion and participation norms for different communication media; 2) a rigid web-conferencing communication structure forced group members to introduce other tools for communication; 3) group discussions were perceived as best in face-to-face environments and worst in teleconferencing; 4) teleconferencing provided the most convenient method for participation; 5) web-conferencing was the most

effective method of facilitating linkage and exchange for groups that had limited budgets, were geographically dispersed, and highly collaborative; and 6) web-conferencing forced group interaction within text.

The findings regarding facilitation suggest that: 1) process facilitation skills were significant in the success of the group irrespective of technology; 2) more technological features required more effort from facilitators; 3) facilitator control of meetings was highest in web-conferencing meetings; and 4) disseminating research required little or no process facilitation expertise.

With regard to information exchange, the findings suggest that: 1) technology and presentation structure had a strong effect on information sharing, but little on evidence sharing and 2) the research task had the strongest effect on the level of evidence within the group.

***2) What are the effects of different types of ICT on linkage and exchange processes?***

Group respondents reported that different types of ICT had different effects on linkage and exchange processes within drug policy groups. Teleconferencing provided a simple and convenient method for participation at a distance and maintained the immediacy and spontaneity in group discussions that was available in the face-to-face meetings. Group members, specifically the decision-making task group, preferred live over pre-recorded teleconferencing because it helped facilitate interactions through live discussions and, in this study, provided a communication link between decision-makers and researchers. Group members found a problem with teleconferencing meetings—that they became distracting.

Web-conferencing was the preferred method of communication when the groups needed to collaborate, had a limited budget, and were geographically dispersed, which occurred in the education task group. Groups with these traits found web-conferencing to be a more valuable medium than teleconferencing because it provided a much richer forum for interaction through its voting and polling, whiteboard, application sharing, and display of participant information functions. However, certain group respondents noted some difficulties with using web-conferencing, especially with the communication structure that it enforced on the group, which dampened social interactions within the group.

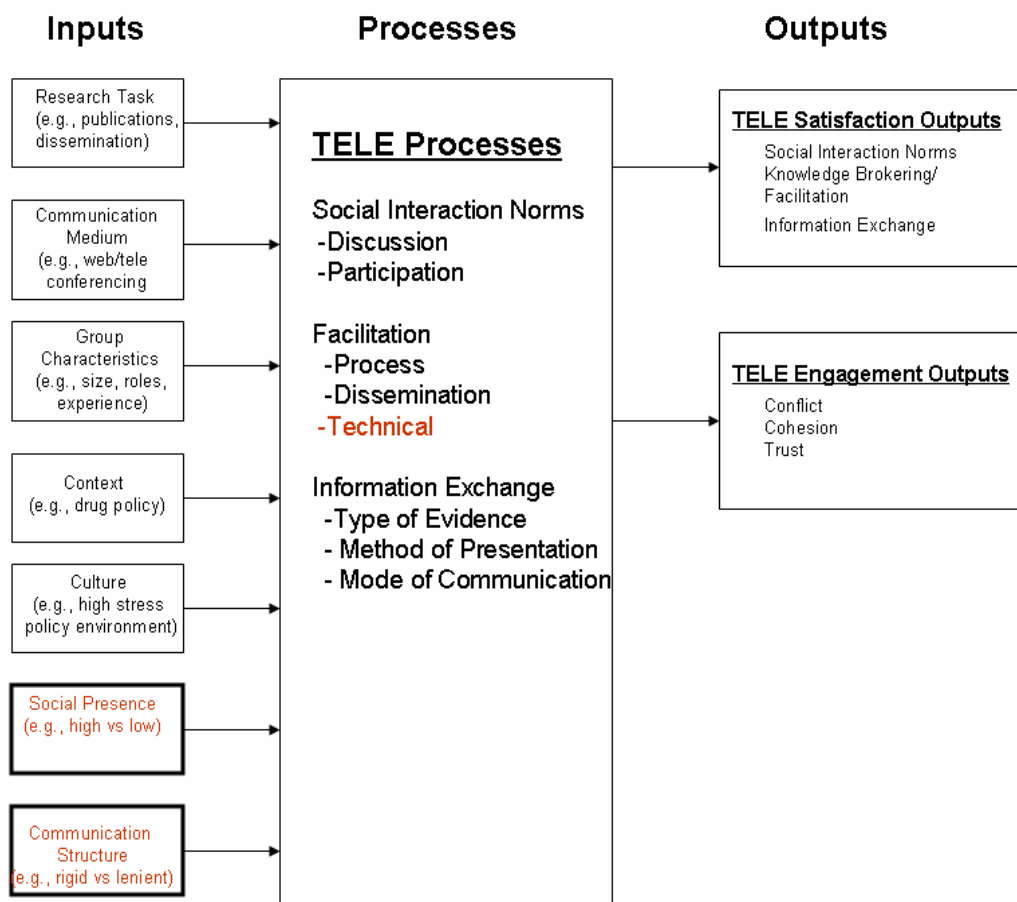
***3) How should linkage and exchange group processes be operationalized in the TELE conceptual framework?***

The initial TELE conceptual framework has been built on previous ICT conceptual models; however, it is contextually sensitive to the inputs, processes, and outputs relevant to linkage and exchange. The previous conceptual models of Nunamaker et al. (1991), Pinsonneault and Kraemer (1989), and Sambamurthy et al. (1993) were generic conceptual models, which focused on evaluating the effects of technology on group process outputs, whereas the TELE conceptual framework focused on evaluating the linkage and exchange process of distant technology-enabled drug policy groups.

The application of the initial conceptual framework to drug policy groups produced new and refined inputs and processes. The new inputs, which were discussed in the findings, are communication structure and social presence. For processes, social interaction norms will remain focused on discussion and participation. For facilitation, they will remain focused on two facilitation styles: process facilitation and dissemination

facilitation. Another facilitation function will be added, technical facilitator. The information exchange process will remain the same. Figure 5 presents the refined TELE conceptual framework based on the results of the study.

**Figure 5. Refined Technology-Enabled Linkage and Exchange Conceptual Framework.**



Sources: Pinsonneault & Kraemer, 1989; Sambamurthy, Poole, & Kelly, 1993; Straus, 1997, Huberman, 1990; Landry, Lamara, & Amari, 2001; Lenfant, 2003; Rich, 1991, 1997. Burke, Aytes, & Chidambaram, 2001; Dennis, 1996; Miranda & Bostrom, 1993; Mehrabian Qtd in Rourke et al., 2001; DeSanctis & Poole (1994).

### **5.5 Relationship of Results to the Previous Literature**

The results of the study relate to the literature on ICT in three distinct areas: social interaction norms, information exchange, and facilitation. In general, the ICT literature tends to view social interaction norms within a group as a way to bring a form of

governance to online environments. Group members learn through social interaction norms what is or is not socially acceptable within a group. Social interaction norms are crucial for the smooth operation of group meetings and interactions when technology is used to collaborate at a distance (Danis & Lee, 2005). In the education, research, and decision-making task groups, the findings indicated that each group introduced various implicit and explicit social interaction norms to facilitate group interactions within its meetings. Each group introduced both similar and dissimilar social interaction norms to facilitate its individual group discussions and participation. This diversity in social interaction norms can be explained by the differences in group inputs, such as group characteristics, culture, and technology structure. This is similar to the findings of Yates, Orlikowski, and Rennecker (1997) in their study of the use of collaboration technology among organizational group members. Studying three groups within an organization for a seven-month period, the investigators found that social interaction norms developed uniquely in the different groups. These differences were attributed to group size, task, and orientation towards the new technologies. Group members replicated similar social interaction norms within the new system and made innovations in creating new norms, including highlighting text in documents, embedding documents created in other media, and implementing faster turnaround in group-to-group discussions.

Within the education, research, and decision-making task groups, no explicit norms were introduced into the groups to regulate behaviours. In other studies, for example, that of Ackerman et al. (1997), the groups involved in the study explicitly introduced social norms into the technology-enabled group and outlined social repercussions for not adhering to the social interaction norms. In Ackerman et al.'s

(1997) study, the groups used high audio quality for communication where users had the option to listen and speak during group discussions. The group consisted of nine members working on engineering-related projects. The group members developed social interaction norms for dealing with background noise; for knowing when someone was present and listening; and for limiting violations of personal privacy. Sanctions stopped unwanted behaviour. A concerted effort was made to adhere to the social norms, and the result was improved group meetings. It is not clear why drug policy did not introduce explicit social norms to influence group behaviour within the study. Many of the group behaviours, expressions of social interaction norms, within this study occurred implicitly. Multiple explanations may account for why explicit rules for moderating group behaviour were not expressed. Group members may have relied on the facilitator to carry out the task; may have been too busy; or may not have believed that controlling social behaviour was a major issue that affected group meetings.

According to the findings of the research, each of the three drug policy groups used a different communication media to carry out meetings. The education task group preferred web-conferencing to facilitated group communication by teleconference and face-to-face. The research task group essentially abandoned teleconferencing and web-conferencing in favour of face-to-face communication. The decision-making task group preferred teleconferencing to facilitate group communication. This suggests that each group produced social interaction norms while using communication media, which defined how the group worked together. Over time, the three groups found the communication media that best facilitated their group interactions becoming the norm under which group members operated. This is similar to the findings of Orlikowski and

Yates (1994) in their study of technology-enabled knowledge workers and computer language designers, who collaborated on a multiyear project of developing various programming languages. The authors analyzed over 2000 transcripts of archived e-mails, finding that when a group forms, members come to an agreement, whether implicitly or explicitly, on which communication media to use. When group members incorporate these norms into the group, they produce social interaction norms that define how the group works together. Over time, the groups studied reinforced the pattern of social interaction until it became the main method by which group members worked with each other. These social interaction norms continued to change and evolve as circumstances changed within the group.

Within the ICT literature, the process facilitator has traditionally been an individual from outside the group, trained in the skills of managing group interactions while remaining neutral during group discussions (Anson, Bostrom, & Wayne, 1995). Essentially, the process facilitator's role within a technology-enabled environment has been passive and contained in providing either group process support or group technical support (Dickson, Partridge, & Robinson, 1993). Within the study, however, the findings demonstrate that the process facilitator was an active member of the group and involved in the group process as well as engaged in managing the groups' interactions; this contrasts with the traditional process facilitator role discussed in the ICT literature.

In the findings, the drug policy groups noted the importance of having a trained process facilitator manage group interactions to improve group meetings. For example, in the research task group, a respondent described how the facilitator took the initiative in managing the group interactions, which resulted in improved group interactions and

group meetings. In a related study on the effects of facilitators on group processes, Anson, Bostrom, and Wayne (1995) analyzed the consequence of group decision support systems (GDSS) and the influence of a process facilitator on group performance and on group interaction processes. The results demonstrated that the groups that had more structure through process facilitation, but without GDSS support, demonstrated better group processes than GDSS-supported groups that lacked process facilitator support. Based on their findings, the authors observed that: process facilitation is a critical factor for improving GDSS effectiveness; higher quality process facilitation improves the meeting process; and training and experience is important to building high quality process facilitation skills. Anson, Bostrom, and Wayne's (1995) research findings were reflected in the statements of participants in the drug policy groups regarding process facilitation.

With regard to the dissemination facilitator, the literature notes that the dissemination facilitator (i.e., knowledge broker) has a very active function focused on the facilitation of interactions between researchers and decision-makers. Essentially, the function of a dissemination facilitator includes bringing people together to exchange information; helping group participants communicate and understand each other's needs and abilities; and guiding decision-makers through sources of research by synthesizing and summarizing the research for them (CHSRF, 2004). Within this study, especially in the decision-making task group, the dissemination facilitator primarily focused on presenting drug policy research information to decision-makers. This was achieved by bringing decision-makers and researchers together and helping them communicate and understand each other's information needs, using technology. Even though much of the

literature on the dissemination facilitator revolved around face-to-face interactions, the study showed that the functions of the dissemination facilitator were also evident within a technology-enabled environment. The use of technology had little effect on the dissemination facilitator role.

Study findings show that technology had little effect on the level of evidence in information exchange, but did affect how the information was shared. In the ICT literature, many of the studies have focused on the use of information in problem solving tasks, such as admitting university students, general decision-making, or product development (Dennis, 1996; Van den Herik and de Vreede 1997; Graetz et al. (1998); and others). More specifically, the ICT literature on information exchange has focused on the various types of information and how they are distributed and the challenges associated with its distribution (Cramton & Ovis, 2003). The literature discussing the effects of technology on the level of evidence and information sharing is scarce.

### ***5.6 Practical Implications***

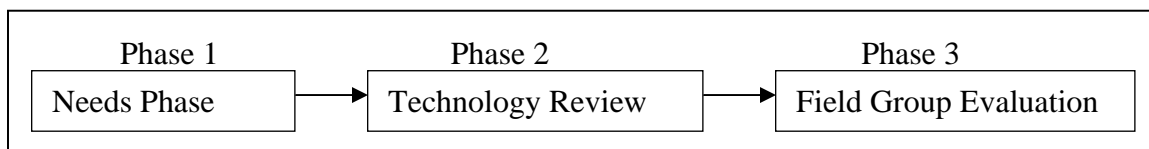
Based on the findings of the study and the researcher's experience with the groups in this study, the following recommendations for COMPUS and other similar organizations are offered regarding the use of information and communication technologies to support linkage and exchange activities. Five recommendations follow: 1) understand the group's technological needs; 2) introduce communication rules appropriate to the group; 3) take time to prepare the material shared in the meeting; 4) use a technical and process facilitator in web-conferencing meetings; and 5) include an ongoing evaluation of meetings.

## 1) Understand the Group's Technological Needs

The study findings suggest that understanding a group's technological needs is one of the most important tasks that COMPUS can carry out when implementing a TELE strategy. In the study, the education, research, and decision-making task groups had different technological needs that were relevant to the group characteristics, research tasks, context, and culture as described in the conceptual framework. Therefore, COMPUS should undertake a needs assessment to determine the types of technologies to use for the groups they will be interacting with.

The needs assessment includes three phases. In phase one, a needs assessment is carried out in the form of a questionnaire, and appropriate technologies are identified. In phase two, a review of the various technologies is carried out. In phase three, various technologies are evaluated by a group in a field setting. It is strongly recommend that COMPUS or similar organizations work with friendly and cohesive working groups, who are open to undertaking a process of evaluation that may require an investment of time by group members at the beginning of the process. Figure 6 highlights the three phases.

**Figure 6. Needs Assessment Phases.**



### ***Phase 1: Needs Phase***

In this phase, all or selected group members fill out a needs analysis questionnaire. If selected members are asked to fill out the questionnaire, COMPUS or a similar organization must ensure that the group members intimately understand the nature of the group dynamic before they attempt to make a correct assessment of the group. An

alternative may be to send out the questionnaire to all group members. It is recommended that e-mail or an online survey tool (e.g., Survey Monkey) be used. Once the questionnaires have been returned, responses can be summarized, outlining the needs of the group. Responses will help in the selection of the appropriate technology for the group. Suggested survey questions, which have been adapted from *Communique Conferencing* (2007), are provided and are separated into two sections. The first section determines if the group needs to use information and communication technology to meet.

**Does the Group Need ICT:**

**Q1. Communication Budget:** What is the total monthly budget allocated to the meetings?

**Q2. Participants:** How many people are expected to participate in the group?

**Q3. Separation:** Are the individuals geographically separated from one another?

**Q4. Consistency:** Will the participants remain consistent from meeting to meeting or will they change?

**Q5. Number of Meetings:** How many meetings will be conducted each week, month, or quarter? Will usage fluctuate depending on the time of year?

For example, based on the above questions, in case of a limited communication budget, if many participants are spread across the country, if the number of group members participating is consistent, and if the group meets once every month, then they need technology to help them communicate. If the group has enough of a communication budget for face-to-face meetings, if the group members are in close proximity, and if the group meets once every one or two months, then face-to-face can be a viable option for the group.

If answers to the questions from the group indicate there is a need to use technology for communication, a second set of questions will help COMPUS or a similar organization determine which type of communication technology would be most effective for the group. A number of questions may be used to assess this.

**What Type of ICT would be Appropriate?**

Q1. **Willingness to Learn:** Are group members willing to orient themselves with new technologies, such as web-conferencing?

Q2. **Content:** What type of content will be presented (PowerPoint slides, software applications, web-based applications, documents, spreadsheets)?

Q3. **Interactivity:** What degree of interactivity does the group require (conversing, presenting/listening, Q&A, polling and voting, application sharing, text chatting, live video, file sharing, etc)?

Q4. **Software Solution:** Does the group want their own software solution or a hosted solution?

Q5. **Technical Support:** How much technical support or event management support does the group require?

Q6. **Security:** Would it matter if group discussions were heard or accessed by others?

A description of a scenario using these questions in phase 2 is provided.

***Phase 2: Technology Review***

Subsequent to carrying out the needs analysis, COMPUS or a similar organization will require a clear understanding of the group's needs. Below is an example of how an education task group might be described.

**Does the Group Need ICT:**

Q1. **Communication Budget:** Very limited, not more than \$500 per month.

Q2. **Participants:** 10-15 participants in monthly meetings.

Q3. **Separation:** High; group members in different provinces.

Q4. **Consistency:** Range from 10-15.

Q5. **Number of Meetings:** One per month consistently throughout the year.

**What Type of ICT would be Appropriate?**

Q1. **Willingness to Learn:** Very high.

Q2. **Content:** Share PowerPoint, spreadsheets, PDF and Word documents.

Q3. **Interactivity:** Voting and polling, text chatting, application sharing, and file sharing.

Q4. **Software Solution:** Hosted.

Q5. **Technical Support:** Need dedicated facilitator to help group with technology issues.

Q6. **Security:** Sensitive information discussed; therefore, security needs are high.

In light of the above information, it is recommended that the education task group use information and communication technologies to communicate. First, the group has a

limited communication budget of \$500 per month. This means that the group would not be able to meet face-to-face every month given the number of participants and the geographic separation among the group members.

With this information, COMPUS or a similar organization can decide what type of technology will be required for the group. Given, as indicated in the example of the education task group, that the willingness to learn is high, the group will be sharing different forms of content (i.e., PowerPoint, spreadsheets and Word documents) to perform their task, and that the need to interact is paramount, it is recommended that the group use a technology, such as web-conferencing. It is suggested that a vendor who hosts a web-conferencing technology on their servers be used. This would ensure that the information recorded during the meetings remains secure. Furthermore, it is suggested that the group engage a technical facilitator familiar with the technology to provide technical support to the group.

Finally, an issue of interest to both the education and research task groups is the use of half-duplex (one person speaking via audio at a time) vs. full-duplex communication (more than one person speaking via audio at a time). The technology, Elluminate Live, used in the study is an example of a half-duplex technology. Elluminate Live was designed primarily for teacher-student interactions. Elluminate Live provides communication control to the teacher and allows only one student or person to speak at a time. There are positive aspects to the half-duplex communication structures according to participants in the study. One participant noted that such a method of communication made possible more democratic conversations, where everyone is given an equal voice. However, other participants noted that this form of communication structure limited

spontaneity and immediacy in conversations. Consequently, it is suggested that collaborative groups consider using technologies such as WebEx. WebEx allows for full duplex communication and places no restrictions on voice communication within a group. Absence of such restrictions should provide more spontaneity and immediacy in meetings and perhaps be more conducive to a collaborative type of meeting structure. More recently, Elluminate Live has incorporated full-duplex audio features.

### ***Phase 3: Field Group Evaluation***

To continue with the example, if COMPUS selects several web-conferencing tools, it should test the technologies with groups to determine which one would be most appropriate for group needs. This process would require deploying the web-conferencing software and obtaining feedback on the group's experience of using the technology while supporting a group task. Feedback from the group members would determine which products are best suited for the group. The dimensions included in the survey questionnaire are overall satisfaction, technical issues, and product functionality. COMPUS should promote the technology that is rated the highest among the group for use in groups of the same composition. The researcher created a survey for this process. See Appendix 6 for the questionnaire.

### ***Other Recommendations: Conducting Needs Assessment***

If COMPUS or a similar organization can engage stakeholders in face-to-face meetings, that remains the preferred choice. However, this is difficult to carry out with large geographically dispersed groups. Therefore, it is suggested that COMPUS or a similar organization invest in web-conferencing technologies that are easy to use and allow multiple speakers to speak at a time. This would increase the frequency of the

meetings, improve the level of interaction, and reduce travel time and costs associated with holding such meetings. However, for a collaborative group working together on a specific task, it is suggested that COMPUS or a similar organization have at least an initial face-to-face meeting to establish a rapport between group members before moving towards a technology-enabled meeting strategy.

COMPUS or a similar organization should not discount teleconferencing since it remains the simplest and most convenient method of participation for groups that do not have the time to learn new technologies, are not meeting to collaborate on a specific task, or whose members may be travelling without access to a computer. This describes the decision-making task group included in the study. For the decision-making task group, group members logged in to listen, comment, and learn from researchers (dissemination facilitators) on the latest developments in drug policy research. There was no collaboration or required participation between group members. The participants were asked to attend and allowed to leave as desired. For busy decision-makers who may not have the time to learn web-conferencing or travel to face-to-face meetings, teleconferencing may be a viable alternative; it provides an easy way to communicate while leaving the level of participation up to the individual. If COMPUS or a similar organization wants to update group members regularly on its latest research developments, live teleconferencing sessions remain the most convenient process, followed by pre-recorded sessions for those unable to attend the live meeting.

## ***2) Introduce Communication Rules Appropriate to the Group***

Findings showed that, as they use technology, each group tends to develop its own social interaction norms. For example, the education and research task groups

introduced social interaction norms, for example, raising a hand before speaking and carrying out a communication check at the beginning of the meeting. The decision-making task group introduced strict interaction norms on presentation times and organization of the presentation. Each group developed their own participation and discussion norms.

COMPUS or a similar organization may wish to create and share explicit rules for the different communication media used to communicate to physicians, physician educators, researchers, and decision-makers. Group characteristics, research task, and culture should be taken into account when developing rules for discussion or participation in a technology-enabled environment. For example, in a teleconferencing session, if all the group members know each other or if the group is small (3-5 people), then a discussion rule for identifying oneself is not needed because group members are probably able to identify the speaker. However, if the group is large (>5) or group members are not familiar with each other, then an explicit discussion rule of identifying oneself before speaking is needed.

In the *Houston Business Journal*, Campisi (2003) provides some general etiquette for both teleconferencing and web-conferencing meetings. For teleconferencing, Campisi suggests that group members should begin with introductions with each participant's name, title, and location before sharing an idea or commenting on other's ideas during the call. It is suggested that this rule be applied to large groups whose members have not yet developed a strong rapport with each other. The author also recommends that if a participant is not speaking that person should mute his or her phone so that shuffling papers, typing on the keyboard, and side talking are not heard. If muting is not an option,

group members should be reminded to minimize these potentially distracting actions. The participants in the study made similar comments on etiquette.

Campisi (2003) emphasizes the importance of group members keeping in mind that the objective of the teleconference is to streamline communications and increase productivity. To streamline meetings, COMPUS or a similar organization should encourage groups to decide on specific practices regarding sending documents for group members to review two to five business days before the meeting; scheduling monthly meetings at the same time of the month (for example, 9:30-10:00, the third Tuesday of every month); keeping the agenda specific; and adhering to time limits.

For web-conferencing, Campisi (2003) suggests that members introduce only legible instant messaging texts; make legible annotations on graphs; and use clear language and font sizes. These are important factors to consider as interactions shift from face-to-face to a text-based format. Group members should ensure that their text messaging or annotations on graphs are understandable and legible. Furthermore, Campisi emphasizes that it is important, especially in collaborative type groups, that group members pay attention to the meeting and listen carefully because they may be asked to add input or to share a document. As a rule, participants should not attend to their e-mail or engage in web-browsing during the meeting.

### ***3) Take Time to Prepare the Material Shared in the Meeting***

Findings in the study showed that as group members move from face-to-face environments to a web-conferencing environment, the meeting shifts its focus from individuals meeting in a shared space, such as a room or office, to interactions that occur within the text through the computer screen. Meeting dynamics change so that the text

becomes the focus of the meeting. Therefore, more extensive preparation should be made by COMPUS or similar organizations when presenting information via web-conferencing. The information should be visually appealing to the participants, and the text should be concise and to the point. The visual aspect of the meeting via the whiteboard is what becomes important whereas in face-to-face meetings the area of importance is what the individual has to say. COMPUS and similar organizations should present materials in a way that fits the online medium. On the other hand, COMPUS should not be preoccupied with the effect web-conferencing will have on the level of evidence since, as respondents noted, web-conferencing has little influence on the level of evidence. Instead, COMPUS and similar organizations should focus on how to present the evidence in an appealing and credible way that is persuasive to decision-makers and other stakeholders.

The Canadian Health Services Research Foundation (2000) presented a one-page document on how to give a research presentation to decision-makers. The foundation suggests that in preparing the material the presenter should:

- Identify the specific decision that the research addresses and state it in clear, unambiguous terms.
- Understand who the decision-makers in the audience will be, what they know already, and what new information they need—then tailor the presentation accordingly using plain language.
- Take into account the political, legislative, fiscal, and social factors that provide context for the issue and for the presentation.

- Create a no surprise environment—develop a working relationship with decision-makers early on in the research process.

CHSRF (2000) also suggests that during presentations presenters should:

- Answer the audience's "Why are we here?" question as quickly as possible. Start with a clear statement about the decision or issue that your research is addressing and the objective of the meeting.
- State key messages up front and clearly. Strip out the jargon.
- Focus on the implications of the research for the decision. Downplay the methods and other technical issues, but be prepared to provide succinct information on them if asked.
- Be up front about the limitations of the research results. For example, acknowledge whether they can they be generalized to other situations.
- Establish the credentials of the researchers and presenter(s) but be brief and to the point.
- Use humour, energy and style in the presentation, but make sure it is a style the organization or individual is comfortable with.

These suggestions are most relevant to the decision-making task group; however, for more collaborative type groups that include education or research task groups, it is suggested that they distribute the documents that will be shared before the presentation, even though the documents can be shared via the web-conferencing software. If any PowerPoint documents are presented, it is recommended that the content be clear and concise and that the fonts be large enough for members to read easily. When sharing

documents, the process facilitator should make sure that group members can easily see the documents, can easily read them, and follow along.

#### ***4) Use a Technical and Process Facilitator in Web-conferencing Meetings***

When introducing web-conferencing technologies to a group, it is important to plan for two distinct facilitator roles—one to facilitate the meeting process and the other to facilitate the group's use of technology. Within the research study, this is a significant finding for facilitation. If both types of facilitators are not provided, organizations like COMPUS run the risk of overburdening the facilitation process, leading to its breakdown.

Generally, the role of the facilitator has been an active one within the group process, as the results of this research study have indicated. McFadzean, Somersall, and Coker (1999) describe three phases of group meetings in which the process facilitator plays a role in the group process. The authors noted that it is important to have group agreements on the meeting objective and group agreement on the meeting process during the pre-planning stage. The results of the authors' two field case studies indicated that groups who do not carry out these two important tasks negatively affect the meeting process (McFadzean, Somersall, & Coker, 1999). Therefore, COMPUS or similar organizations should ensure that there are clear objectives to the meeting and that the meeting rules are clear.

According to the literature, the functions of a process facilitator include listening, clarifying, and integrating information; creating an open and positive environment; directing and managing the meeting; and building rapport and relationships among group members (Clawson, Bostrom, & Anson, 1993). The functions of a technical facilitator include: understanding the technologies and their capabilities; creating comfort with the

technology; and selecting and preparing the technology for use by the group (Clawson, Bostrom, & Anson, 1993). COMPUS or a similar organization should ensure that both the technical and process facilitators are trained to develop such qualities.

In summary, based on the findings and experience gained in this study, suggestions for COMPUS or a similar organization were made to improve group functionality. These suggestions covered how to conduct meetings via web-conferencing or teleconferencing as well as issues that need consideration when working with the different styles of groups that have different tasks, culture, context, and group characteristics.

#### ***5) Continuous Evaluation of Meetings are Needed***

Based on this researcher's experience and the study findings, it is recommended that COMPUS and other similar organizations include a TELE evaluator for technology-enabled meetings. The role of the TELE-evaluator will be to improve satisfaction with the meeting outputs based on the three processes (social interactions, information exchange, and facilitation) included in the TELE conceptual framework. The TELE-evaluator should ask the following questions at each meeting:

- 1) In what ways could group etiquette or the quality of person-to-person interactions be improved next time? Examples include displaying pictures of participants at the beginning of a web-conference; asking group members to introduce themselves and their work; suggesting taking five minutes at the beginning of the meeting for casual conversations; and reminding group members that shuffling paper can be distracting during a teleconferencing meeting.

- 2) In what ways could the discussion process be improved? Examples include: setting an explicit restriction on speaking time; introducing explicit directions for when to use text messaging; and emphasizing the expectation that participants do not engage in other work during the meeting.
- 3) In what ways could the participation process be improved? Examples include: raising a hand to speak in face-to-face sessions; using the hand raising function in web-conferencing sessions; supporting the expectation that everyone must participate on every agenda item; and noting explicit directions for using the voting and polling feature.
- 4) Are there suggestions for how facilitation and technical assistance could be improved? Examples include: process facilitator should be provided with further training; process facilitator should or should not be a member of the group; process facilitator needs to improve his or her credibility with the group; process facilitator needs to be more engaging; and process facilitator needs to do more listening and less commenting to help build group cohesiveness and rapport. In regard to the technical facilitator, the technical facilitator may require more training; should be up-to-date on newer or better technologies; should be responsive to technical issues; and should conduct a communication check at the beginning of the meeting.
- 5) What improvement could be made to the format and content of the information exchanged? Examples include: referencing statistics or academic papers when discussing evidence; using more visual presentations; providing hyperlinks to the literature; disseminating the literature or presentation before

the meeting; using more graphics; using certain size fonts and colors that are visually appealing; and taking advantage of application sharing to show literature and Excel files.

Furthermore, it is important that the TELE-evaluator be encouraged to call attention to improvements within the meetings. The TELE-evaluator should document the changes and ensure that the group is following them. This will provide a continuous quality improvement process for the technology-enabled meetings and will help the group improve the linkage and exchange process.

### ***5.7 Study Limitations***

There are a number of limitations in the study. First, limitations follow from using the case study methodology. Although well-established in the social sciences, health informatics, knowledge translation, and ICT literature and, therefore, a widely accepted research methodology, case studies have received criticisms related to reliability, validity, and generalizability (Colorado State, 2005). As noted in an earlier section, qualitative researchers typically do not use such terms, but prefer to use credibility, dependability, confirmability, and transferability when assessing research studies. Furthermore, case study methods have been criticized for not being generalizable to other times, places, or settings. For case studies, generalizations or transferability of findings are limited to case or to cases with similar attributes (Tellis, 1997). However, by analyzing a rich set of descriptions of the research setting and context, as were offered within this study, the reader of the case study will be able to determine the similarities in the research context and determine the applicability of the research findings to his or her own setting. For objectivity or confirmability, readers may be informed by researchers expressing biases

as well as maintaining a neutral stance during the study, which were also included here. Notwithstanding these criticisms, the case study method was an appropriate methodology to choose for this particular study.

In addition, several disadvantages arise from direct content analysis. First, the researcher may analyze the data with a strong, but informed bias, and, therefore, the researcher might provide supportive as opposed to non-supportive evidence to the conceptual or theoretical framework used in the study (Hsieh & Shannon, 2005). Second, the researcher may use probes designed to gain participant agreement with the researcher's conceptual framework and, therefore, lend it unwarranted support (Hsieh & Shannon, 2005). Third, an overemphasis on a conceptual framework or theory may tend to blind the researcher to other important contextual factors within the study (Hsieh & Shannon, 2005). As Hsieh and Shannon (2005) point out, these limitations primarily relate to the researcher's neutrality in the analysis process. This researcher tried to maintain neutrality in the analysis process when coding and analyzing the data. The researcher shared the results with the thesis supervisor and other group members and discussed the coding method and new codes generated in the analysis. The researcher also shared findings with participants of the drug policy groups and obtained feedback from them on observations.

Other limitations of the study arise from the dynamic nature of drug policy groups. For example, each of the groups included throughout the study had a different number of participants, data types, and number of meetings. As a result, it was difficult to compare all three groups across the conceptual categories included in the conceptual framework. Some of the interview questions for each of the groups had to be slightly

modified to take into account group context; further, no baseline data was collected for the decision-making task group. Additionally, not all the groups used the same technologies. The decision-making task group used teleconferencing; the research task group used web-conferencing; and the education task group used both teleconferencing and web-conferencing.

Furthermore, no assumption has been made that the refined TELE conceptual framework represents a final or complete listing of elements. However, the concepts embedded within the refined TELE conceptual framework will at least be sufficient for studying how technology can affect the linkage and exchange process within drug policy groups. Furthermore, research studies investigating the effects of technology on groups have analyzed some combination of input variables and their influence on group processes and outputs within ICT models. Furthermore, not all researchers would agree with the proposed TELE conceptual framework. Some may prefer to see some of the output variables as processes and some of the process variables as potential outputs.

The TELE conceptual framework is not intended to be a comprehensive conceptual framework for evaluating the effects of TELE on group processes; rather, it is intended to place some of the concepts of interest in a context that provides a basis for further discussion and analysis. The consequences of generalizing the framework and its use in other health fields or areas outside healthcare are not known. Future studies can use this conceptual framework as an initial starting point for understanding the influence of technology on the linkage and exchange process.

Furthermore, the study focused on linkage and exchange, a process that occurs within knowledge translation. Future studies should focus on the effects of web-

conferencing and teleconferencing, and other technologies, on knowledge synthesis, knowledge exchange, the contextualization of research findings, the application of research, and decision-making processes.

Lastly, the version of the Elluminate web-conferencing technology employed in the study allowed for half-duplex audio communication that allowed users to speak one at a time. Future studies, should look at the effects of full-duplex web-conferencing technology on TELE processes.

### ***5.8 Chapter Summary***

The chapter presented the high-level findings of the research and provided theoretical implications of the work. In addition, the chapter presented practical implications for organizations, such as COMPUS, to consider when implementing a TELE communication strategy for drug policy groups. Finally, the chapter discussed study limitations.

## Chapter 6: Conclusion

The study contributed to our general knowledge of TELE within drug policy groups. First, an important contribution was the development of a refined TELE conceptual framework that helped in understanding how ICT affects linkage and exchange processes in drug policy groups. Second, the study linked two fields of research (linkage and exchange and ICT) within the context of drug policy to build the initial conceptual framework. Bringing these different fields together fosters science and knowledge development. Third, this study helped to clarify the complexities surrounding drug policy linkage and exchange processes within a technology-enabled environment.

The main finding of this study was that ICT affected linkage and exchange processes in different ways. For example, drug policy groups developed different patterns for participation and group discussions within face-to-face, teleconferencing, and web-conferencing meetings. Technology also influenced the facilitation and information exchange process in different ways as were discussed in the previous chapter.

For future studies, it is recommended that the conceptual framework be tested in other health research domains to determine its generalizability. Such testing would validate, extend, or refine the framework to suit other health research disciplines outside the realm of drug policy. Future studies should explore the effects of ICT on knowledge exchange and knowledge translation activities and processes relating to collaborative problem solving, synthesizing evidence, contextualizing evidence, applying evidence, and decision-making. Future researchers should also study multiple groups in different health domains that involve researchers and decision-makers employing the current

technologies that were used in the study as well as other technologies, such as videoconferencing and group decision support systems.

### ***6.1 Strengths and Weaknesses of Communication Media***

The study examined the use of different communication media when facilitating linkage and exchange within drug policy groups; consequently, the effects of the strengths and weaknesses of different communication media on linkage and exchange meetings are discussed. The aim is to present the high-level strengths and weaknesses of the communication media based on the study findings.

***Strengths of Communication Media for Linkage and Exchange.*** The strengths inherent in face-to-face, teleconferencing, and web-conferencing meetings helped facilitate linkage and exchange within drug policy groups. Face-to-face meetings were the preferred method of communication because participants were more able to discuss original topics and carry out complex discussions. In face-to-face meetings, interactions were much more immediate, spontaneous, and richer than in web-conferencing or teleconferencing meetings. As well, in face-to-face meetings, participants were less distracted and participated more frequently. Face-to-face meetings had an established culture; they are a well accepted method of meeting. Facial expression and body language are a rich source of information for participants, and they contribute to face-to-face meeting's popularity as a meeting form.

Teleconferencing provides a simple and convenient method for groups whose members are distant from one another or for groups with very busy members. Participants can be on the road, on the street, at the airport, in another city, or in another country, but as long as they have access to a phone, they can join the meeting. Teleconferencing

maintains the immediacy and spontaneity in discussions that is automatically available in face-to-face meetings. Pre-recorded teleconferencing meetings have an advantage over live teleconferencing meetings because they allow the participants to listen to recordings at their convenience. However, comparisons of live vs. pre-recorded teleconferencing suggest that live teleconferencing is the preferred method of communication because it offers interactions through live discussions and, in this study, provides a communication link between decision-makers and researchers. Advantages of teleconferencing include: general comfort with the medium, teleconferencing's long history, and new technology that allows innovations, such as making pre-recorded sessions available via teleconference.

Web-conferencing meetings offer strengths with regard to facilitating linkage and exchange between groups. When groups need to collaborate, yet are restrained by a limited budget, and are geographically dispersed, web-conferencing meetings improve linkage and exchange. Groups with such characteristics will find web-conferencing to be a much more valuable medium than teleconferencing because web-conferencing provides a much richer forum for interaction through its voting/polling, whiteboard, application sharing, and display of participant information functions. Furthermore, web-conferencing tools improve meeting interactions by making them more disciplined, helping to keep group members focused on the same information, making the meetings less time consuming, and facilitating democratic decision making during meetings.

For facilitation, face-to-face meetings allow the facilitator to see and read non-verbal cues from group participants. Non-verbal cues play a large role in helping a facilitator manage group interactions. Because non-verbal cues are not available in web-

conferencing (unless video transmission is a component of the meeting) and teleconferencing, the facilitator might interject more often into group discussions to keep the group focused on the agenda. An advantage that web-conferencing has over teleconferencing is that web-conferencing allows the facilitator to see participant names and to recognize who is interested in speaking through the hand raising feature. This is not possible in teleconferencing meetings.

*Weaknesses of Communication Media for Linkage and Exchange.* Weaknesses are found in the use of face-to-face, teleconferencing, and web-conferencing meetings when facilitating linkage and exchange within drug policy groups. Face-to-face meetings are very time consuming and costly. For large groups that are geographically dispersed and deal with a limited budget, face-to-face interactions can be difficult to schedule often. Therefore, face-to-face meetings tend to limit the frequency of linkage and exchange interactions for large geographically dispersed groups with limited budgets.

Weaknesses are also evident in the use of teleconferencing to facilitate linkage and exchange. The conduct of teleconferencing meetings can be distracting if explicit phone etiquette norms are not introduced within the group. For example, participants may shuffle papers, speak out of turn, listen to music, audibly type, or do any of a host of activities that could distract participants during a meeting. With teleconferencing, participants may be more passive because group members may feel disconnected from the group. For an audience interested in obtaining the latest research information, teleconferences are more anonymous because individuals are not required to participate in the meeting; they can join and log off at anytime. Concerning pre-recorded

teleconferencing sessions, the weakness of teleconferencing is that it limits social interaction and does not provide opportunities for social relationships.

Weaknesses emerge as well when web-conferencing is used to facilitate linkage and exchange. The use of web-conferencing enforces a communication structure on the group. Because of the imposed structure (e.g., inability to interrupt a speaker and enforced turn taking in speaking), web-conferencing can suppress spontaneity, group social interactions, and free flowing conversation. Another weakness of web-conferencing is that participants have to surmount a learning curve in order to use the web-conferencing interface. For example, group members who want to share a slide or document will need to learn how to use the application-sharing feature of the technology. Furthermore, a group that is not highly collaborative, not geographically dispersed, and not interested in learning new technologies may not want to use web-conferencing to facilitate linkage and exchange at all despite the potential advantages for working on shared documents.

For facilitation, it is important to note that face-to-face meetings may last longer than teleconferencing and web-conferencing meetings because of the higher level of social interactions. Group members in face-to-face meetings are usually more talkative and focus less on the agenda. Therefore, the facilitator needs to place more effort on keeping the group focused on the task at hand. In teleconferencing and web-conferencing meetings, the facilitator can feel disconnected from the group due to the lack of facial expression and body language that are a rich source of information for facilitators. The ability to read these non-verbal cues is important in helping the facilitator manage group interactions.

Concerning information exchange, the use of live teleconferencing to disseminate research information does not cause a change in policy; it functions more as a news service or a dissemination tool. In web-conferencing, the technology limits the amount of information that can be shared. For instance, group members cannot share large documents via web-conferencing because of screen size limitations.

### ***6.2 Summary Statement–Contribution to Knowledge***

The research described in the thesis has contributed to the general theoretical and practical understanding of the role of information and communication technologies on linkage and exchange processes within drug policy groups. First, the research demonstrated the effects of different group inputs (research task, communication media, group characteristics, context, and culture) have on linkage and exchange processes within drug policy groups. More specifically, the study focused on the effects of different communication media (face-to-face, teleconferencing, and web-conferencing) on social interactions, facilitation, and information exchange processes. Differences became evident within the drug policy groups according to how they adapted to the different communication media to facilitate linkage and exchange processes; these processes, in turn, focused on social interactions, facilitation, and information exchange. According to the literature, the differences in how the groups used communication media can be accounted for by differences in group research tasks, group characteristics, group context, and group culture (Yates, Orlikowski, & Rennecker, 1997).

Second, the research identified parallels the literature on ICT and the literature on linkage and exchange. The review of the literature in ICT and linkage and exchange led to the development of an initial conceptual framework to study linkage and exchange

processes within drug policy groups. The initial conceptual framework examined previous conceptual models from the ICT literature that had uncovered numerous constructs that could be used for group inputs, processes, and outcomes in the study of the use of ICT in groups. Over 80 inputs, processes, and outcomes were initially uncovered during reviews of only four conceptual models and two theoretical models. However, common inputs between the conceptual models were included in the initial conceptual framework used to study drug policy groups. These inputs, used in the ICT literature, were contextualized to fit the study of linkage and exchange within drug policy groups. For example, the group input, the task used in ICT conceptual models, was changed to research task to represent it within the context of linkage and exchange and specifically within drug policy.

The group processes included in the TELE conceptual framework were initially identified in the literature of ICT and linkage and exchange. In the literature review on linkage and exchange, social interactions, knowledge brokering (facilitation), and information exchange were found to be important linkage and exchange processes. Within the ICT literature, similar processes were found, which were studied, however, neither within the context of linkage and exchange nor within the context of drug policy. Drawing parallels between the two literatures was an important step in the development of a conceptual framework to study technology-enabled drug policy groups. Similarly, group outputs were created because of linking both the ICT and linkage and exchange literature. Linking these two separate literatures together is a contribution to the advancement of the ICT and linkage and exchange literature.

Third, applying the conceptual framework as a framework from which to study TELE within drug policy groups led to the development of a more refined conceptual framework. This validated and expanded the use of the original inputs, processes, and outputs described in the initial conceptual framework. As a result, the refined conceptual framework provided a representation of important inputs, processes, and outputs relevant to linkage and exchange within drug policy groups. Such a conceptual framework can be used to study future linkage and exchange processes of drug policy groups.

Fourth, three linkage and exchange models—the dissemination, knowledge brokering, and the two-communities models—were used as a justification for including social interaction, information exchange, and knowledge brokering (facilitation) processes within the conceptual framework. The traditional use of these models primarily focused on face-to-face interactions with a dearth of research examining their use within a technology-enabled environment. This research study validates and supports the use of the linkage and exchange models within technology-enabled environments, especially in drug policy groups.

Fifth, in terms of social presence theory, which suggests that a higher degree of interaction between individuals materializes with a higher presence of non-verbal cues, body movement, and eye contact, all of which increase sensory stimulation (Mehrabian Qtd in Rourke et al., 2001), the study found that different communication technologies provided varying levels of social presence. For example, web-conferencing had a higher degree of social presence than did teleconferencing. The study also found that the selection of the appropriate communication media for group communication was highly influenced by factors other than social presence, which included geographical distance

between group members and a budget that supported face-to-face meetings. The findings suggested that drug policy groups that were not geographically dispersed, had a budget to support group travel, and were highly collaborative preferred face-to-face communication, which provides the highest form of social presence. However, if these groups were unable to meet face-to-face because of budget constraints and geographical separation, the groups were content to use other forms of communication, such as teleconferencing and web-conferencing. This demonstrates that groups may find it important to meet face-to-face because of the higher level of interactions; however, they are limited by geographical dispersion and budgets that do not allow traveling for face-to-face meetings.

Sixth, with regard to Adaptive Structuration Theory (AST), the use of ICT introduced structures that influenced the rules and resources governing social interactions (DeSanctis & Poole, 1994). In the study, AST helped explain why groups adapt to the use of ICT differently. According to AST, the use of ICT introduces structures that influence the rules and resources that govern social interactions. Within drug policy groups, new forms of social interaction norms were introduced to moderate the influence of ICT. Each group adapted to the technologies used in the study differently. The findings presented in the thesis support the use of AST to understand how groups use and are influenced by the use of ICT to govern group social interactions.

Seventh, from a methodological perspective, the use of a case study, which was supported by a conceptual framework to guide the research, provided an in-depth look into how linkage and exchange processes develop within a technology-supported environment. In the past literature on ICT, the field has had numerous papers published in

academic peer reviewed information system journals, but only a few studies have directly explored the effects of ICT on group processes (Huang & Zhang, 2004). Most of the ICT literature has focused on measuring group process outcomes (Zigurs, Poole, & DeSanctis, 1988) and on group inputs, such as task, technology, group characteristics, and context (Dennis, Nunamaker, & Vogel, 1991). However, this study adds to the ICT literature by providing an in-depth view of how group processes occur within a technology-enabled environment, applying a new conceptual framework. Using a case study method helps to provide an in-depth look at how processes develop within TELE groups. In addition, the use of multiple data sources in the analysis made it feasible to examine the nature of the results in the context of the other data collected.

In conclusion, this study has made a significant scientific contribution to advancing our understanding of the role information and communication technologies play in shaping linkage and exchange processes within drug policy groups. The study has led to findings not previously reported and has built on the ICT and linkage and exchange literature to present a refined conceptual framework for studying TELE within drug policy groups. In addition, the research has important implications for the domains of linkage and exchange, ICT, and drug policy by providing a framework for the evaluation and improvement of TELE meetings. In summary, the research described in the thesis has contributed in a number of original ways to the advancement of scientific knowledge.

## References

- Ackerman, M. S., Hindus, D., Mainwaring, S. D., & Starr, B. (1997). Hanging on the wire: A field study of an audio-only media space. *ACM Transactions on Human-Computer Interaction*, 4(1), 39-66.
- Amabile, T. M. Patterson, C., Mueller, J., Wojcik, T., Odomirok, P., Marsh, M., & Kramer, S. (2001). Academic-practitioner collaboration in management research: a case of cross-profession collaboration. *Academy of Management Journal*, 44(2), 418-431.
- Anson, R., Bostrom, R., & Wayne, B. (1995). An experiment assessing group support system and facilitator effects on meeting outcomes. *Management Science*, 41(2), 189-208.
- Anson, R., Fellers, J., Kelly, G. G., & Bostrom, R. (1996). Facilitating research with group support systems. *Small Group Research*, 27(2), 179-214.
- Benbasat, I., & Lim, L. H. (1993). The effects of group, task, context, and technology variables on the usefulness of group support systems: A meta-analysis of experimental studies. *Small Group Research*, 24(4), 430-462.
- Berg, B. (1989). *Qualitative research methodology*. 3rd ed. Boston: Allyn & Bacon.
- Berntsen, K. E., Sampson, J., & Osterlie T. (n.d.). Interpretive research methods in computer science. Retrieved December 23, 2005, from <http://www.idi.ntnu.no/~thomasos/paper/interpretive.pdf>
- Black, M. E. (1997). Student nurse's clinical decision-making key to professional practice. *Dissertation Abstracts International*. Ph.D. Dissertation: University of Toronto, Toronto, Ontario, Canada. (UMI No. AAT NQ27764).

- Booth, W. C., Colomb, G. G., & Williams, J. M. (2003). *The craft of research*. Chicago: University of Chicago Press.
- Borgatti, S. (n.d.) Introduction to grounded theory. Retrieved January 20, 2006, from <http://www.analytictech.com/mb870/introtoGT.htm>
- Boudreau, M. C. (1997). Report on the discussion at the panel on assessing critical theory research in information systems at the international federation for information processing working group 8.3. Retrieved December 21, 2005, <http://www.people.vcu.edu/~aslee/Philadelphia-CST.htm>
- Burke, K., Aytes, K., & Chidambaram, L. (2001). Media effect on the development of cohesion and process satisfaction in computer-supported workgroups. *Information Technology and People, 14*(2), 122-141.
- Cameron, R., Brown, K. S., & Best, J. A. (1996). The dissemination of chronic disease prevention programs: linking science and practice. *Canadian Journal of Public Health 87* Suppl 2:S50-3.
- Campisi, J (2003). Minding manners: Conferencing technologies involve new etiquette. *Houston Business Journal*, Friday, August 1, 2003. Retrieved December 23, 2007, from <http://houston.bizjournals.com/houston/stories/2003/08/04/focus4.html>
- Canadian Health Services Research Foundation [CHSRF]. (2000). How to give a research presentation to decision-makers. Ottawa. Retrieved December 23, 2007, from [http://www.chsrf.ca/knowledge\\_transfer/pdf/presentation\\_e.pdf](http://www.chsrf.ca/knowledge_transfer/pdf/presentation_e.pdf)
- Canadian Health Services Research Foundation [CHSRF]. (2004). The theory and practice of knowledge brokering in Canada's health system. Ottawa. Retrieved September 15, 2004 from

[http://www.chsrf.ca/brokering/pdf/Theory\\_and\\_Practice\\_e.pdf](http://www.chsrf.ca/brokering/pdf/Theory_and_Practice_e.pdf)

Canadian Health Services Research Foundation [CHSRF]. (2008). Glossary of knowledge exchange terms as used by the foundation. Ottawa. Retrieved May 20, 2008, from [http://www.chsrf.ca/keys/glossary\\_e.php](http://www.chsrf.ca/keys/glossary_e.php)

Canadian Institutes of Health Research [CIHR]. (2002). Knowledge translation overview. Ottawa: Retrieved December 15, 2004, from [http://www.cihirsc.gc.ca/about\\_cihr/organization/knowledge\\_translation/resources/overview\\_e.shtml](http://www.cihirsc.gc.ca/about_cihr/organization/knowledge_translation/resources/overview_e.shtml)

Canadian Institute for Health Information [CIHI]. (2007). Drug expenditure in Canada. Ottawa. Retrieved June 13, 2007, from [http://secure.cihi.ca/cihiweb/dispPage.jsp?cw\\_page=AR\\_80\\_E](http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=AR_80_E)

Canadian Optimal Medication Prescribing and Utilization Service [COMPUS]. (2004). Retrieved November 10, 2005, from [https://www.ccohtaccohta.ca/compus/compus\\_intro\\_e.cfm](https://www.ccohtaccohta.ca/compus/compus_intro_e.cfm)

Central West Health Planning Information Network [CWHPIN]. (2000). A framework for evaluating the utilization of health information products. University of McMaster, Hamilton, Ontario.

Changing Minds. (2006). Social Norms. Retrieved November 15, 2005, from [http://changingminds.org/explanations/theories/social\\_norms.htm](http://changingminds.org/explanations/theories/social_norms.htm)

Chen, C. (1999). A protocol analysis model for investigating computer supported problem-solving activities. *Information Technology, Learning, and Performance Journal*, 17(2), 35-44.

- Cheol, H., & Rich, R. F. (1996). Explaining the use of information in public policy making. *Knowledge and Policy*, 9(1), 3-33.
- Clark, H. (1999). The growth of Canadian knowledge networks. *Journal of Knowledge Management*, 3(4), 304-309.
- Clawson, V., Bostrom, R., & Anson, R. (1993). The role of the facilitator in computer-supported meetings. *Small Group Research*, 24(4), 524-547.
- Colorado. State of. (2005). Writing guides: Conducting observational research. Retrieved November 15, 2005, from <http://writing.colostate.edu/guides/research/observe/com2d2.cfm>
- Collins, K., Onwuegbuzie, A. J., & Qun, J. G. (2006). Prevalence of mixed-methods sampling designs in social science research. *Evaluation and Research in Education*, 19(2), 83-101. *Management Information Systems Quarterly*, 12(4), 625-644.
- Communique Conferencing. (2003). Choosing a web conferencing solution. Retrieved June 13, 2003 from <http://www.ccimeet.com/choosingawebconferencesolution.pdf>
- Cramton C. D., & Orvis, K. L. (2003). Overcoming barriers to information sharing in virtual teams. In C. Gibson & S. Cohen (Eds.), *Creating conditions for effective virtual teams* (pp. 214-230). San Francisco, CA: Jossey-Bass.
- Cramton, C. D. (2001). The mutual knowledge problem and its consequences for dispersed collaboration. *Organization Science*, 12(3), 346-371.
- Cramton, C. Finding common ground in dispersed collaboration (2002). *Organizational Dynamics* 30(4), 356-367.

- Creswell, J. W. (2002). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Upper Saddle River, NJ: Pearson Education.
- Creswell, J.W. (2003). *Research Design: Qualitative, Quantitative and Mixed Method Approaches*, 2nd ed. Sage Publications: Thousand Oaks, CA.
- Danis, C., & Lee, A. (2005). Evolution of norms in a newly forming group. In M. F. Costabile & F. Paterno (eds.), *Proceedings of IFIP TC13 International Conference on Human-Computer Interaction — INTERACT 2005*, pp. 522-535.
- Dennis, A. R. (1996). Information exchange and use in small group decision-making. *Small Group Research*, 27(4), 532-550.
- Dennis, A. R., George, J. F., Jessup, L. M., Nunamaker, J. F., & Vogel, D. R. (1988). Information technology to support electronic meetings. *Journal of Management Information Systems*, 12(4), 591-624.
- Dennis, A. R., Nunamaker, J. F., & Vogel, D. R. (1990). A comparison of laboratory and field research in the study of electronic meeting systems. *Journal of Management Information Systems*, 7(3), 107-135.
- Dennis, A.R., Venkatesh, V., & Ramesh, V. (2003) Adoption Of Collaboration Technologies: Integrating Technology Acceptance And Collaboration Technology Research. *Robert H.Smith School of Business Publication*; Van Munching Hall. Retrieved July 17, 2008, from <http://www.indiana.edu/~isdept/research/papers/tr142.doc>
- DeSanctis, G. L., & Gallupe, R. B. (1987). A foundation for the study of group decision support systems. *Management Science*, 33(5), 589-609.

- DeSanctis, G., & Poole, M. (1994). Capturing the complexity in advanced technology use: Adaptive structuration theory. *Organization Science*, 5(2), 121-147.
- Dickson, G., Partridge, J., & Robinson, L. (1993). Exploring modes of facilitative support for GDSS technology. *Management Information Systems Quarterly*, 17(2), 173-194.
- Eaves, Y. (2001). A synthesis technique for grounded theory data analysis. *Journal of Advanced Nursing*, 35(5), 654-663.
- Eisenhardt, K. (1989). Building theories from case study research. *Academy of Management Review*, 14(4), 532-550.
- Ericsson, K., & Simon, H. (1993). *Protocol analysis*. Cambridge, MA: MIT Press.
- Eveland, J. D., & Bikson, T. K. (1989) Work group structure and computer support: A field experiment. *ACM Transactions on Office Information Systems*, 6(4), 354-379.
- Finnegan, P., & O'Mahony, L. (1996). Group problem solving and decision-making: An investigation of the process and the supporting technology. *Journal of Information Technology*, 11, 211-221.
- Fuhrman, S. (1994). Uniting producers and consumers: Challenges in creating and utilizing educational research and development. In Tomlinson & Tuijnman (eds.), *Education research and reform: An international perspective*, (pp. 133-147). Washington, DC: US Department of Education.
- Good R. (2003-2007). Small office and home office web conferencing and live presentation tools. Retrieved January 15, 2005, from [http://www.masternewmedia.org/2003/09/18/how\\_do\\_i\\_select\\_web.htm](http://www.masternewmedia.org/2003/09/18/how_do_i_select_web.htm)

- Picard, A (2006). Drug costs out of control. *Globe and Mail* (2006). 11 May 2006.  
Retrieved November 15, 2005, from  
<http://72.14.253.104/search?q=cache:1xICWKz6aikJ:www.healthcoalition.ca/outofcontrol.pdf+drug+costs+cibi+2006&hl=en&ct=clnk&cd=7&gl=ca>
- Graetz, K., Boyle, E., Kimble, C., Thompson, P., & Garloch, J. (1998). Information sharing in face-to-face, teleconferencing and electronic chat groups. *Small Group Research*, 29(6), 714-743.
- Hayne, S. (1999). The facilitators perspective on meetings and implications for group support systems design. *Database*, 30(4), 72-91.
- HealNet. (1999). June Report 4(1). Retrieved November 15, 2005, from  
<http://hiru.mcmaster.ca/nce/reports/june99.pdf>
- Hinssen, P. (1998). What difference does it make? The use of groupware in small groups. *Telematica Institute Fundamental Research Series*. Netherlands. No. 002 (TI/FRS/002).
- Hoepfl, M. C. (1997). Choosing qualitative research: A primer for technology education researchers. *Journal of Technology Education*, 9(1), 47-63.
- Hollingshead, A., McGrath, J., & O'Conner, K. (1993). Group task performance and communication technology: A longitudinal study of computer-mediated versus face-to-face work groups. *Small Group Research*, 24(3), 307-333.
- Hsieh, H. F., & Shannon, S. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277-1288.
- Huang, W., & Zhang, P. Z. (2004). An empirical investigation of the effects of GSS and group process on group outcome in small group decision-making. *The Journal of*

*Computer Information Systems*, 45(1), 23-29.

Huang, W. W., & Wei, K. K. (2000). An empirical investigation of the effects of group support systems (GSS) and task type on group interactions from an influence perspective. *Journal of Management Information Systems*, 17(2), 181-206.

Huberman, M. (1990). Linkage between researchers and practitioners: A qualitative study. *American Educational Research Journal*, 27(2), 363-391.

International Development Research Centre [IDRC]. (2003). Coalition for Global Health Research. *Knowledge translation in health and development: Research to policy strategies*. Ottawa: Author and Canada Institute of Population Health, University of Ottawa. Retrieved January 10, 2006, from [http://www.idrc.ca/uploads/user-S/10963022581KT\\_in\\_Health\\_and\\_Development.pdf](http://www.idrc.ca/uploads/user-S/10963022581KT_in_Health_and_Development.pdf)

Knoll, K., & Jarvenpaa, S. L. (1995). Learning to work in global virtual teams. *Proceedings of the Twenty-Eighth Hawaii International Conference of Systems Sciences*, 92-101.

Knowledge Utilization Studies in Practice [KUSP]. (2003). Overview of Champion/Opinion Leader/Knowledge Broker. Retrieved March 15, 2003, from <http://www.nursing.ualberta.ca/estabrooks/kusp/DatabaseOverview.htm>

Koch, N., & Davidson, R. (2003). Can lean media support knowledge sharing? Investigating a hidden advantage to process improvement. *IEEE Transactions on Engineering Management*, 58(2), 151-163.

Kondracki, N., Wellman, N., & Amundson, D. (2002). Content analysis: review of methods and their applications in nutrition education. *Journal of Nutrition Education and Behavior*, 34(4), 224-230.

- Kraemer, K. L., King, J. L. (1988). Computer-based systems for cooperative work and group decision-making. *ACM Computing Surveys*, 20(2), 115-146.
- Kushniruk, A. W., Patel, V. L., & Marley, A. J. (1998). Small worlds and medical expertise: Implications for medical cognition and knowledge engineering. *International Journal of Medical Informatics*, 49, 255-271.
- Landry, R., Lamara, M., & Amari, N. (2001). Climbing the ladder of research utilization. *Science Communication*, 22, 396-422.
- Lau, F., & Hayward, R. (2000). Building a virtual network in a community health research training program. *Journal of the American Medical Informatics Association*, 7, 361-377.
- Lavis, J. N., Robertson, D., Woodside, J. M., McLeod, C. B., & Abelson, J. (2003). How can research organizations more effectively transfer research knowledge to decision-makers? *Milbank Quarterly*, 81(2), 221-248.
- Lenfant, C. (2003). Shattuck lecture—clinical research to clinical practice—lost in translation? *New England Journal of Medicine*, 349(9), 868-874.
- Leung, P. (1992). Translation of knowledge into practice. In Walcott & Associates, *NIDRR national CRP panel final report*. Washington, DC: Walcott & Associates.
- Lincoln, Y., & Guba, E. (1985). *Naturalistic inquiry*. New York: Sage.
- Lomas, J. (1993). Diffusion, dissemination and implementation: Who should do what? *Annals of the New York Academy of Sciences*, 703, 226-235.
- Lomas, J. (2000). Using linkage and exchange to move research into policy at a Canadian foundation: Encouraging partnerships between researchers and policy makers is the goal of a promising new Canadian initiative. *Health Affairs* 18, 236-240.

- Maclure, M., & Potashnik, T. (1997). What is direct evidence-based policy-making? Experience from the drug benefits program for seniors in British Columbia. *Canadian Journal on Aging/Canadian Public Policy*, 23, Supplement 1, 132–146.
- Mark, G. (2002.). Conventions and commitments in distributed CSCW groups. *Computer Supported Co-operative Work*. 11, 349-387.
- Market Wire. (2004). Elluminate launches global channel partner program for live eLearning and web conferencing. Retrieved June 30, 2008, from [http://findarticles.com/p/articles/mi\\_pwwi/is\\_200403/ai\\_mark3724598113](http://findarticles.com/p/articles/mi_pwwi/is_200403/ai_mark3724598113)
- McFadzean, E., Somersall, L., & Coker, A. (1999). A framework for facilitating group processes. *Strategic Change*, 8(7), 421-431.
- McGrath, J. (1984). *Groups: Interaction and performance*. Englewood Cliffs, NJ: Prentice-Hall.
- McGrath, J. (1991). Time, interaction and performance (TIP): a theory of groups. *Small Group Research*, 22(2), 147-174.
- McGrath, J. E., & Hollingshead, A. B. (1994). *Groups interacting with technology: Ideas, evidence, issues, and an agenda*. Thousand Oaks, CA: Sage.
- McKay, J., & Marshal, P. (2001). The dual imperatives of action research. *Information Technology and People*, 14(1), 46-59.
- McLeod, P. L. (1992). An assessment of the experimental literature on electronic support of group work: results of a meta-analysis. *Human-Computer Interaction*, 7(3), 257-280.
- McLaughlin, J. A., & Jordan, G. B. (1999). Logic models: A tool for telling your program's performance story. *Evaluation and Program Planning*, 22(1), 65-72.

- Mehta, V., Kushniruk, A., Gauthier, S., Richard, Y., Deland, E., Veilleux, M., & Grant, A. (1998). Use of evidence in the process of practice change in a clinical team: A study forming part of the auto control project. *International Journal of Medical Informatics* 51,169-180.
- Meyrowitz, J. (1985). *No sense of place: The effect of electronic media on social behavior*. New York: Oxford University Press.
- Milbank Memorial Fund. (2001). *The Cochrane collaboration: Informing judgement: Case studies of health policy and research in six countries*. New York.
- Miranda, M. S., & Bostrom, P. R. (1993). The effect of group support systems on group conflict and conflict management. *Journal of Management Information Systems*, 10(3), 63-96.
- Morse, J. (2005). Qualitative research is not a modification of quantitative research. *Qualitative Health Research*, 15(8), 1003-1005.
- Myers, M. (1997). Qualitative research in information systems. Information System World. Retrieved December 15, 2005, from <http://www.qual.auckland.ac.nz/>
- Niderman, F., Beise, C., & Beranek, P. M. (1996). Issues and concerns about computer supported meetings: The facilitator's perspective. *Management Information Systems Quarterly*, 20(1), 1-23.
- Nunamaker, J. F., Dennis, A. R., Valacich, J. S., Vogel, D. R., & George, J. F. (1991). Electronic meeting systems to support group work. *Communications of the ACM*, 34(7), 40-61.
- Oh, C. H., & Rich R. F. (1996). Explaining use of information in public policymaking. *Knowledge and Policy*, 9(1), 33-35.

- O'Sullivan, E., & Rassel, GR.(1999). *Research methods for public administrators* (3rd ed.). New York: Addison Wesley Longman, Inc.
- Orlikowski, W. J., & Yates, J. (1994). *Genre repertoire: Norms and forms for work and interaction*. Center for Coordination Science Technical Report #166, March 1994. Retrieved March 15, 2006, from <http://ccs.mit.edu/CCSWP166.html>
- Paisley, W. (1993). Knowledge utilization: The role of new communication technologies. *Journal of the Society for Information Science*, 44, 222-234.
- Patel, V. L., Kaufman, D. R., Allen, V.G., Shortliffe, E. H., Cimino, J. J., & Greenes, R. A. (1999). Toward a framework for computer-mediated collaborative design in medical informatics. *Methods of Information in Medicine*, 38(3), 158-176.
- Pinsonneault, A., & Kraemer, K. L. (1989). The effect of technological support on groups: an assessment of the empirical research. *Decision Support Systems*, 5(2), 197-216.
- Poole, M., & DeSanctis, G. (1989). Understanding the use of group decision support systems: The theory of adaptive structuration. In C. Steinfeld & J. Fulk (eds.), *Theoretical approaches to information technologies in organizations*, (pp. 173-193). Beverly Hills, CA: Sage.
- Poole, M., Holmes, M., & DeSanctis, G. (1991). Conflict management in a computer-supported meeting environment. *Management Information Systems Quarterly*, 37(8), 926-953.
- Poulos, R., Zwi, A., & Lord, S. (2007). Towards enhancing national capacity for evidence informed policy and practice in falls management: A role for a translation task group? *Aust New Zealand Health Policy*. 4 (6).

- Rich, R. (1991). Knowledge creation: Diffusions and utilization. *Creation, Diffusion, Utilization, 12*(3), 319-337.
- Rich, R. F. (1997). Measuring knowledge utilization: Processes and outcomes. *Knowledge and Policy: International Journal of Knowledge Transfer and Utilization, 3*, 11-24.
- Russel, J. M. (2001). Scientific communication at the beginning of the twenty-first century. *Unesco International Social Science Journal, 53*(168), 271-282.
- Rynes, S.L. Bartunek & R. Daft (2001). Across the great divide: knowledge creation and transfer between practitioners and academics. *Academy of Management Journal, 44* (2), 340 – 355.
- Sambamurthy, V., Poole, M. S., & Kelly, J. (1993). The effects of variations in GDSS capabilities on decision-making processes in groups. *Small Group Research, 24*(4), 523-546.
- Searle, J. (1993). Participant observation: a way of conducting research. Retrieved March 28, 2005 from [http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content\\_storage\\_01/0000019b/80/13/f1/10.pdf](http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/13/f1/10.pdf)
- Sechrest, L., Backer, T. E., & Rogers, E. M. (1994). Synthesis of ideas for effective dissemination. In L. Sechrest, T. E. Backer, E. M. Rogers, T. F. Campbell, & M. L. Grady (eds.), *Effective dissemination of clinical and health information: Conference summary* (pp. 187-196). AHCPR Pub. No. 95-0015. Rockville, MD: Agency for Health Care Policy and Research.
- Shields, P., & Tajalli, H. (2006). Intermediate theory: The missing link to successful

- student scholarship. *Journal of Public Affairs Education*. 12(2), 313-334.
- Shortliffe, E. H., Patel, V. L., Cimino, J. J., Barnett, G. O., & Greenes, R. A. (1998). A study of collaboration among medical informatics research laboratories. *Artificial Intelligence in Medicine* 12(2), 97-123.
- Siegel, J., Dubrovsky, V., Kiesler, S., & McGuire, T. W. (1986). Group processes in computer mediated communication. *Organization Behavior and Human Performance*, 37, 157-187.
- Soumerai, S. B., Ross-Degnan, D., Fortess, E. E., & Walser, B. L. (1997). Determinants of change in medical pharmaceutical cost sharing: Does evidence affect policy? *The Milbank Quarterly*, 75(1), 11-34.
- Straus, S. (1997). Technology, group process and group outcomes: Testing the connections in computer mediated and face-to face groups. *Human-Computer Interaction* 12(3), 227-266.
- Sundquist, J. (1978). Research brokerage: The weak link. In R. L. Lynn (ed.), *Knowledge and policy: The uncertain connection* (pp. 126-144). Washington, DC: National Academy of Science.
- Syed-Ikhsan, S. O. S. & Rowland, F. (2004). Knowledge management in a public organization: A study on the relationship between organizational elements and the performance of knowledge transfer. *Journal of Knowledge Management*, 8 (2), 95-111.
- Teasly, S., & Wolinsky, S. (2001). Communication: Scientific collaboration at a distance. *Science*, 292(5525), June 22, 2254-2255.

- Tellis, W. (1997). Introduction to case study. *The Qualitative Report*, 3(2). Retrieved December 20, 2005, from <http://www.nova.edu/ssss/QR/QR3-2/tellis1.html>
- Thomson, B. (2007) Qualitative research: Grounded theory—sample size and validity. Retrieved December 20, 2006, from <http://www.buseco.monash.edu.au/research/studentdocs/mgt.pdf>
- Trochim, W. M (2005). Research methods knowledge base: Types of data. Retrieved December 20, 2005, from [www.socialresearchmethods.net](http://www.socialresearchmethods.net)
- Urquhart, C. (2001). An encounter with grounded theory: Tackling the practical and philosophical issues. In E. Trauth (ed.), *Qualitative research in IS: Issues and trends* (pp. 104-140). Hershey, PA: Idea Group Publishing.
- Valacich, J. S., Paranka, D., George, J. F., & Nunamaker, J. F. (1993). Communication concurrency and the new media: A new dimension for media richness. *Communication Research*, 20(2), 249-276.
- Van den Herik, K. W., & Jan de Vreede, G. (1997). GSS for cooperative policymaking: No trivial matter. *Proceedings of the International ACM SIGGROUP Conference on Supporting Group Work: The Integration Challenge* (pp. 148-157). Phoenix, AZ:
- Varkevisser, C. M., Pathmanathan, I., & Brownlee, A. (2003). *Designing and conducting health systems research projects. Volume I: Proposal development and fieldwork*. Amsterdam: KIT Publishers.
- Watson D.E, Broemeling A.M, Reid R.J, & Black C. (2004). A results-based logic model for primary health care: Laying an evidence-based foundation to guide performance measurement, monitoring and evaluation. *Centre for Health Services*

*and Policy Research*. University of British Columbia. Retrieved July 10, 2008, from <http://www.chspr.ubc.ca/files/publications/2004/chspr04-19.pdf>

Weyden, M. B. (2002). Clinical practice guidelines: Time to move the debate from the how to the who. *The Medical Journal of Australia*, *176*(7), 304-305.

Willison, D. J., & MacLeod, S. M. (1999). The role of research evidence in pharmaceutical policy making: Evidence when necessary but not necessarily evidence. *Journal of Evaluation in Clinical Practice*, *5*(2), 243-249.

Yates, J., Orlikowski, W. J., & Rennecker, J. (1997). Collaborative genres for collaboration: Genre systems in digital media. *Hawaii International Conference on System Sciences*, *6*, 50-59.

Yin, R. K. (2003). *Case study research*. Thousand Oaks, CA: Sage.

Zigurs, I., Poole, M. S., & DeSanctis, G. (1988). A study of influence in computer-mediated group decision-making. *Management Information Systems Quarterly*, *12*(4), 625-644.

**APPENDIX**

## APPENDIX 1: Educator Baseline Questions

Hi, My name is Mowafa Househ and I am a graduate student at the School of Health Information Science at the University of Victoria. First, I would like to thank you for agreeing to participate in the study. The purpose of the study is to research the determinants of successful linkage and exchange to improve the use of research evidence by drug benefit plan managers when formulating drug policy decisions. During the study your group will be introduced to information communication technology (ICT) to support your Academic Detailing Network (ADN). The following questionnaire was formulated to help us understand the current mechanisms by which knowledge is translated by your group to drug benefit plans.

I will ask you questions about your group history, knowledge translation and linkage and exchange activities and communication technologies used within the group. Please keep in mind that the questions relate to the Canadian Academic Detailing Collaborative and the current communication between provinces relating to Academic Detailing. Do you have any questions before we proceed?

**1. History:** These questions relate to the group history.

- 1) Please indicate who you communicate with the most in the Collaboration?
  - a) What are the methods by which you communicate? (E-mail, face-to-face, teleconference)
  - b) Please define what you mean by most? (frequency)
- 2) Please indicate who you contact the least in the Collaboration?
  - a) What are the methods by which you communicate? (E-mail, face-to-face, teleconference)
  - b) Please define what you mean by least? (frequency)

**2. Group:** I will ask you questions relating to the Collaboration.

**Role Definition:** These questions relate to roles within the Collaboration (focusing on ADN)

1. Could you describe your role within the collaboration?
  - a) What are the clear parts about your role?
  - b) What are the ambiguous parts about your role?

**Group Discussions:** These questions relate to the nature of discussions within your group.

- a) Could you describe the nature of discussions that have occurred in your previous collaborative meetings?
- b) What sorts of disagreements arise and how does the group resolve them?
  - a. Are disagreements based on ideas or personal issues?
- c) What sort of tasks does the group do within a meeting?
  - a. Are group members task focused? (Y/N). Could you elaborate?

- d) Do group members display signs of joking and positive socio-emotional behaviour in the group? (Y/N) Could you elaborate?

Cohesiveness: The questions relate to cohesiveness of the collaboration

1. Choose one of the following: You feel
  - a) 1) Included in most ways 2) Included in some ways, but not in others 3) that you don't belong at all
  - b) Could you elaborate on your answer?
2. How would you feel about moving to another collaboration group and doing the same work:
  - a) 1) You would very much want to stay where you are 2) It would make no difference to you 3) you would very much want to move
  - b) Could you elaborate?

Process Perception: These questions relate to the perception of the work process

- a) What are the goals and objectives of the group?
  - a. Are group members well committed to the goals and objectives of the collaboration? Could you elaborate?
- b) Do group members exhibit trust within the group? Could you elaborate?
- c) Are group members open and frank in expressing their ideas and feelings? Could you elaborate?
- d) Do group members demonstrate a strong sense of belonging to the group? Could you elaborate?

3. Knowledge Translation/Linkage and Exchange Tasks: These questions relate knowledge translation and linkage and exchange tasks:

1. Have you been involved in the preparation of a proposal to fund Academic Detailing in the past? (Y/N).
  - a) Could you describe the process by which you arrived at your evaluation question for the proposal?
    1. Who was involved in the process? (Decision-makers, Researchers)?
  - b) Could you describe the process of how you disseminate to funding agencies the progress of your academic detailing? (Oral, Reports, Presentations etc)
    1. Who was involved in the process of dissemination? (Decision-makers, Researchers)
  - c) What sort of annual reports do you have to do for the funding agency?
    1. Who was involved in the process of publication?
  - d) How do you talk about the evidence supporting ADN program when speaking to your respective funding agencies?

- e) Over the period of funding, have you convinced the funding agencies to provide you with more funding? If yes, how did your reports enable that to happen?
- f) One of the goals of this project is to measure linkage and exchange KT success what would success look like to you? (Please remember we are looking for the perspective of the funding agency).
  - 1. What would lack of success look like to you?
- g) How would you imagine the process of linkage and exchange occurring that would be beyond your expectations? (i.e., the ideal situation).

**4. Technology:** The next set of questions relate to your perceptions of communication technology

- 1. The purpose of this project is to enhance the collaboration of your group for ADN projects through use of web conferencing technologies that allow you to communicate via, voice, whiteboards, sharing files (Excel, PowerPoint etc.) What do you perceive as the benefits of these technologies for your group?
  - a) What do you perceive as the disadvantages that will be faced by the group when using such technology to communicate?
  - b) What do you perceive the challenges to be for the group when using such technology to communicate?

*Finally, do you have any advice on how I should modify this questionnaire?*

Thank you for your time...

## APPENDIX 2: Researcher Baseline Questions

Hi, My name is Mowafa Househ and I am a graduate student at the School of Health Information Science at the University of Victoria. First, I would like to thank you for agreeing to participate in the study. The purpose of the study is to research the determinants of successful linkage and exchange and Knowledge Translation (KT) to improve the use of research evidence by drug benefit plan managers when formulating drug policy decisions. During the study your group will be introduced to information communication technology (ICT) to support your research network. The following questionnaire was formulated to help us understand the current mechanisms by which knowledge is translated by your group to drug benefit plans.

I will ask you questions about your group history, knowledge translation and linkage and exchange activities and communication technologies used within the group. Please keep in mind that the questions relate to the Income Based Deductible (IBD) Evaluation that you are currently involved in. Do you have any questions before we proceed?

**1. History:** These questions relate to the group history.

- 1) Please indicate who you contact the most in the group?
  - a) What are the methods by which you communicate? (E-mail, face-to-face, teleconference)
  - b) Please define what you mean by most?
  
- 2) Please indicate who you contact the least in the group?
  - a) What are the methods by which you communicate? (E-mail, face-to-face, teleconference)
  - b) Please define what you mean by least?

**2. Knowledge Translation and Linkage and Exchange Tasks:** These questions relate to knowledge translation and linkage and exchange tasks:

1. Have you been involved in the evaluation of Pharmacare Policies in the past? (Y/N).
  - a) Could you describe the process by which you arrived at your research question for a study (example reference pricing)?
    1. Who was involved in the process?
    2. How often do you involve decision-makers such as Ms. X and Ms. Y?
  
  - b) Could you describe the process by which you disseminate research information to Pharmacare decision-makers?
    1. Who was involved in the process of dissemination?
    2. How often do you involve decision-makers such as Ms. X and Ms. Y?

- c) Could you describe the process by which you publish research results?
  - 1. Who was involved in the process of publication?
  - 2. How often do you involve decision-makers such as Ms. X and Ms. Y?
- d) Could you describe to the process by which the research information is given context (made relevant) to Pharmacare?
  - 1. Who was involved in the process of contextualizing research information to drug plans?
  - 2. How often do you involve decision-makers such as Ms. X and Ms. Y?
- e) Could you describe to me the process of how your research evidence has been implemented by Pharmacare?
  - 1. Who was involved in the process of implementation?
  - 2. How often do you involve decision-makers such as Ms. X and Ms. Y?
- f) One of the goals of this project is to measure KT success what would success look like to you?
  - 1. What would lack of success look like to you?
- g) How would you imagine the process of linkage and exchange occurring that would be beyond your expectations?

**3. Group:** I will ask you questions relating to the group itself.

Role Definition: These questions relate to roles within the group (focusing on IBD)

- 1. Could you describe your role within the group?
  - a) What are the clear parts about your role?
  - b) What are the ambiguous parts about your role?

Group Discussions: These questions relate to the nature of discussions within your group.

- a) Could you describe the nature of discussions that have occurred in your previous IBD meetings?
- b) How does the group resolve disagreements?
- c) Are disagreements based on ideas or personal issues?
- d) Are group members task focused? (Y/N). Could you elaborate?
- e) Do group members display signs of joking and positive socio-emotional behaviour in the group? (Y/N) Could you elaborate?

Cohesiveness: The questions relate to cohesiveness of the group

- 1. Choose one of the following: You feel
  - a) 1) Included in most ways 2) Included in some ways, but not in others 3) that you don't belong at all
  - b) Could you elaborate on your answer?

2. How would you feel about moving to another group and doing the same work:
  - a) 1) You would very much want to stay where you are 2) It would make no difference to you 3) you would very much want to move
  - b) Could you elaborate?

Process Perception: These questions relate to the perception of the work process

- a) Are group members well committed to the goals and objectives of the group? Could you elaborate?
- b) Do group members exhibit trust within the group? Could you elaborate?
- c) Are group members open and frank in expressing their ideas and feelings? Could you elaborate?
- d) Do group members demonstrate a strong sense of belonging to the group? Could you elaborate?

**4. Technology:** The next set of questions relate to your perceptions of communication technology

1. The purpose of this project is to enhance the collaboration of your group for IBD evaluations throughout the use of web conferencing technologies that allow you to communicate via, voice, whiteboards, sharing files (Excel, PowerPoint etc.) What do you perceive as the benefits of these technologies for your group?
  - a) What do you perceive as the disadvantages that will be faced by the group when using such technology to communicate?
  - b) What do you perceive the challenges to be for the group when using such technology to communicate?

*Finally, do you have any advice on how I should modify this questionnaire?*

Thank you for your time...

### APPENDIX 3: Post-Study Interview Questionnaire

#### INTERVIEW SCRIPT

The purpose of this interview will be to understand how technology effected various group processes within your group over time. I am going to ask you some questions and audiotape the interview. All information will be kept confidential. Is that Ok?

#### Part A:

1. How long have you been involved in the (Educator (ADN)/Decision-maker (Tele-briefing/Researcher (EQIP)) group?
2. What has been your role in the group?
3. Your group communicated via teleconferencing and web-conferencing and they have met occasionally face to face? Is that correct? Are there any other technologies or methods of communication that were used?
  - a) Can you describe how teleconferencing was used in your group?
    - i. Describe advantages
    - ii. Describe disadvantages
  - b) Can you describe how web-conferencing was used in your Group?
    - i. Describe advantages
    - ii. Describe disadvantages
  - c) Can you describe how technology was used in face-to-face meetings in your group?
    - i. Describe advantages
    - ii. Describe disadvantages
4. How was PowerPoint used in (teleconferencing, web-conferencing, face-to-face)?
  - a) Describe Advantages
  - b) Describe Disadvantages
5. How were the group interactions managed? (eg., by the facilitator)
6. Was there an agreed upon process or approach for arriving at decisions within your group? If so, can you describe it and give an example?
  - a) Was that a typical decision process?
  - b) Did your approach to decision-making change over time?
  - c) Was this affected by the technology?
7. Did the introduction of information technology (such as teleconferencing and web-conferencing) change your group's work? If so, how did the different technologies affect that?
  - a) Information Exchange
    - i. Did the introduction of information technology change the type of evidence discussed during meetings? (eg., personal opinion, literature, work experience....) If so, how did the different technologies affect that?
    - ii. Did the introduction of information technology change the way evidence was presented to your group? (eg., Oral, written, PowerPoint) If so, how did the different technologies affect that?
    - iii. Did the introduction of information technology change how evidence was shared between group members? If so, how did the

different technologies affect that?

iv. Facilitation/Knowledge Brokering

1. Did the introduction of information technology change how the facilitator facilitated the meeting? If so, how did the different technologies affect that?
2. Did the introduction of information technology change how the facilitator disseminated research knowledge to the group? If so, how did the different technologies affect that?
3. Any ideas about how the use of technology (web-conferencing or teleconferencing) could have been improved to better facilitate your group's work?

8. Social Interaction norms refer to rules that a group uses for structuring and organization the way the work and communicate within a meeting. These rules may be stated explicitly within the group or they may be unstated and develop on their own over time.

An example of a stated or explicit norm would be when the group decides that whenever someone logs into a teleconferencing call that they must identify themselves before they speak. An example of an implicit or unstated norm would be that people introduce themselves without the group specifically saying that they must do so.

- a) Were there any explicit/stated norms or rules that were set within your group in teleconferencing sessions?
- b) Were there any implicit/unstated norms or rules that were set within your group in the teleconferencing sessions?
- c) Were there any explicit/stated norms or rules that were set within your group in web conferencing sessions?
- d) Were there any implicit/unstated norms or rules that were set within your group in web-conferencing sessions?

**Part B:**

1. For this part of the interview can you click on the URL I sent you so I can ask you a few more questions? You will need your speaker or a headset to listen.
  - a) Do you remember this meeting?
  - b) Was this representative of a typical meeting you had?
  - c) What was your overall impression of how easy it was to use the (web-conferencing/teleconferencing) for a session like this?

- d) Did you have any problems with using this (web-conferencing/teleconferencing) for such meetings?
  - i. Can you describe each of them?
- e) How did the (web-conferencing/teleconferencing) effect the way you interacted with your colleagues?
- f) How did (web-conferencing/teleconferencing) change the way you conduct your meetings as compared to how they were done before you used the (web-conferencing/teleconferencing)?
- g) For that meeting, were there any stated rules or norms that you see emerge?
- h) For that meeting, were there any unstated rules or norms that you see emerge?

#### APPENDIX 4: Post-Study Survey Questionnaire (Education Task Group Sample)

##### Linkage and Exchange Satisfaction Outputs

*Q1. Based on your experience with technology in your group, how would you rate the effects of the following communication media on Decision-maker and Researchers or Educator **social interactions**?*

<b>Communication Medium</b>	Very Effective	Effective	Neutral	Ineffective	Very Ineffective
Face-to-Face					
Teleconferencing					
Web-conferencing					

*Q2. Based on your experience with technology in your group, how would you rate the effects of the following communication media on **information sharing** between Decision-makers and Researchers or Educators?*

<b>Communication Medium</b>	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
Face-to-Face					
Teleconferencing					
Web-conferencing					

*Q3. Based on your experience with technology in your group, how would you rate the effects of the following communication media on **facilitation** between Decision-maker and Researchers or Educators?*

<b>Communication Medium</b>	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
Face-to-Face					
Teleconferencing					
Web-conferencing					

##### Engagement Linkage and Exchange Outputs

*Q1. Based on your experience with technology could you rate which communication medium was most effective in building **trust** between Decision-makers and Educators or Researchers?*

<b>Communication Medium</b>	Very Effective	Effective	Neutral	Ineffective	Very Ineffective
Face-to-Face					
Teleconferencing					
Web-conferencing					

*Q2. Based on your experience with technology, could you rate which communication medium was most effective in building a strong sense of belonging (**cohesion**) between*

*Decision-makers and Educators or Researchers?*

<b>Communication Medium</b>	Very Effective	Effective	Neutral	Ineffective	Very Ineffective
Face-to-Face					
Teleconferencing					
Web-conferencing					

*Q3. Based on your experience with technology could you rate which communication medium was most effective in reducing **conflict** between Decision-makers and Educators or Researchers?*

<b>Communication Medium</b>	Very Effective	Effective	Neutral	Ineffective	Very Ineffective
Face-to-Face					
Teleconferencing					
Web-Conferencing					



A description of drug policy groups, of how they are interconnected and of how they evolved over time is provided below. Observation data is used to describe the group interactions.

The interactions of the three drug policy groups within their groups and with COMPUS in a very complex, highly volatile policy environment is described below with observation data. The group interaction structure is divided into three periods: early (January to August 2004), intermediate (September 2004 to October 2005), and late stages (November 2005- June of 2006).

***Early Stage Interactions between Drug Policy Groups:*** During this period (January to August 2004), the research task group, Drug Policy Futures (DPF) research group, working on evaluating the B.C. Fair Pharmacare Income Based Deductible (IBD) drug policy program; the education task group, the Canadian Academic Detailing Collaboration (CADC); the decision-making task group, B.C. Pharmacare Program; and COMPUS and Health Canada represented the groups interacting during the early stages of the study.

In 2003 the collaboration between the Drug Policy Futures Group (DPF) and B.C. Pharmacare Program, a publicly funded drug benefit plan, were formalized when CIHR awarded a 5-year \$1 million Interdisciplinary Capacity Enhancement grant, called *Drug Policy Futures: Forecasting, Financing, Governance, Public Values and Evidence* to evaluate the effects of a Pharmacare policy on costs and health outcomes within British Columbia.

During the same period, another group formed, the Canadian Academic Detailing Collaboration (CADC). Its purpose was to facilitate academic detailing programs from

several Canadian provinces working with COMPUS to streamline preparation of educational materials; to pool experience on dissemination methods; and to evaluate the effectiveness and efficiency of academic detailing programs. Prior to their establishment, the individual programs had been communicating via teleconference and had a first face-to-face meeting while presenting a facilitated poster session at the Canadian Association of Medical Education Annual Meeting, April 2002. They met again at the Canadian Association of Population Therapeutics in May 2003 where with Health Canada they started to plan a national collaboration to evaluate Canadian academic detailing programs with the help of DPF researchers. In 2004, Health Canada funded the evaluation of the CADC under its Best Practices Contribution Program (BPCP).

At the same time, in March of 2004, COMPUS was created as a publicly funded Canadian organization “to identify, promote and facilitate best practices in drug prescribing and use among health care providers and consumers” (COMPUS, 2004). Part of the objectives of COMPUS were to coordinate its efforts with other groups working within the drug policy domain such as physicians, researchers, drug policy decision-makers, and physician educators (i.e., academic detailers) to become a recognized Canadian centre for best practice information and education on drug prescribing and use (COMPUS, 2004). The COMPUS research priority areas included the creation of best practice prescribing information on proton-pump inhibitors, diabetes management, and anti-hypertensive drugs.

*Intermediate Stage Interactions between Drug Policy Groups:* Key developments took place in the development of drug policy group interactions for the

period between September 2004 and October 2005: 1) creation of live teleconference meetings for drug plan decision-makers and staff and 2) the discontinuation of DPF meetings on the B.C. Fair Pharmacare drug policy evaluation. This period can be characterized as one of intermediate stage interactions between drug policy groups because of a greater number of interactions between drug policy groups as outlined below.

In September of 2004, as part of Health Canada's Best Practices Contribution Program (BPCP), a group of researchers working with DPF started to disseminate research information, in teleconferences supported by PowerPoint slides, to various Canadian drug plan decision-makers and staff. The DPF group also invited COMPUS to participate in these meetings. For the live teleconferencing meetings, information on a specific research topic, instructions for connecting to the meeting via teleconference, and PowerPoint slides were sent to drug plan decision-makers and staff, and COMPUS staff in advance of the meetings. During the meeting, a researcher acting as a dissemination facilitator would present on the topic for about fifteen minutes followed by five minutes of questions from the participants. Six live teleconferences were presented between September 2004 and February 2005.

Also, during September 2005, the DPF group met face-to-face, and followed up by teleconferencing in the same month, to discuss the evaluation of the British Columbia Fair Pharmacare policy program. Subsequent to that meeting, the DPF group did not meet to discuss the B.C. Pharmacare evaluation. However, representatives from DPF continued to work with CADAC and COMPUS during this period on other initiatives.

Other events that occurred during this period were a face-to-face meeting between

COMPUS and CADC in October 2004 and the participation of COMPUS in the monthly technology-enabled meetings with CADC members beginning in July of 2005.

In summary, during this period, the interactions were more frequent and complex because COMPUS began communication with CADC and drug plan decision-makers; DPF researchers began to interact with numerous drug plans; and DPF researchers stopped communicating with each other on the British Columbia Fair Pharmacare drug policy evaluation, but started another initiative: communicating with drug plan decision-makers and staff through monthly live teleconferences.

***Late Stage Interactions between Drug Policy Groups:*** Two important events took place during the period between November 2005 and January 2006: 1) creation of another research initiative: the Education for Quality Improvement of Patient Care (EQIP), and 2) the creation of the pre-recorded teleconferencing initiative. Researchers of the EQIP initiative became the replacement for the original research group. This period can be characterized as one of late stage interactions between drug policy groups because of continued interactions from the previous periods and more interaction through the creation of EQIP.

EQIP was created in November 2005, with stated objectives to 1) educate physicians about the difference in price between therapeutically equivalent drugs, and 2) equip physicians with tools for quality improvement of patient care. The EQIP group was composed of DPF, BC Medical Association, the University of British Columbia Medical School Division of Continuing Professional Development and Knowledge Translation (CPD-KT), and BC Pharmacare researchers who worked together to plan the implementation and evaluation of the cost effectiveness of the EQIP program.

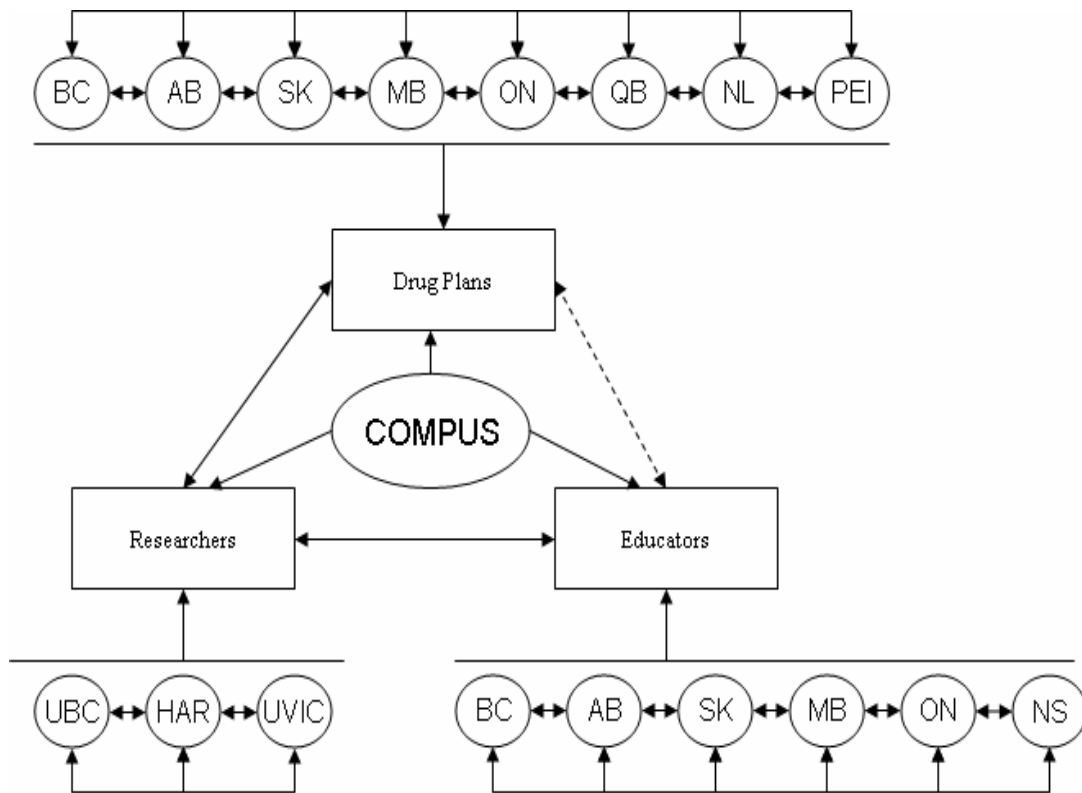
Also during this period, the DPF group resumed the monthly teleconferencing, but because of the difficulties of scheduling the sessions so busy decision makers could attend, DPF resorted to pre-recorded teleconferencing instead of live teleconferencing. The pre-recorded teleconferencing that occurred in January of 2006 consisted of a pre-recorded session presented by a dissemination facilitator in a brief and concise format e-mailed to decision-makers along with PowerPoint slides on a specific topic of interest.

In summary, during this period, the interactions were more frequent and complex than the previous two periods because EQIP issues were addressed by DPF, BCMA, BC PharmaCare, and CPD-KT and pre-recorded teleconferences were created. During this period, CADC members were communicating with each other, with COMPUS and with the DPF group; DPF group members were communicating with each other and with drug plans, and with CPD-KT, CADC, and BCMA; and COMPUS was interacting with CADC and with drug plan decision-makers.

### ***Summary of Drug Policy Group Interactions***

Figure 1A conceptually represents the interactions that have occurred within the drug policy groups over the entire two-year period. On a conceptual level, the whole consists of four main groups: drug plan decision-makers, researchers, educators, and COMPUS. As is apparent from the previous discussion, their relationships were simple initially, but became more complex over time.

**Figure 1A: Conceptual Drug Policy Group Communication Structures**



Legend: 1) UBC (University of British Columbia) 2) HAR (Harvard University) 3) UVIC (University of Victoria) 4) BC, AB, SK, MB, ON, NS, NL, PEI abbreviations for participating Canadian provinces 5) COMPUS (Canadian Optimal Medication Prescribing & Utilization Service).

It is clear that that all four groups at one time or another had some kind of direct communication, represented by the arrows connecting the four groups (Figure 1A). One exception is the indirect communication of CADC with drug plans, represented by the dashed arrow. Outside of this case study, individual academic detailing programs also established their own relationship with their local provincial drug plans.

Furthermore, the numerous circles that connect the drug plan, educator, and

researcher represent different groups. For example, the circles labelled BC, AB, SK, and so on, connecting with each drug plan rectangular box represent each of the provincial drug plans that participated in the study. The arrows between the circles were included to show that they also communicated with each other in some fashion. Similarly, the circles connecting with each group and the educator rectangle box represented the various provincial academic detailing programs. Also in a similar fashion, the circles connecting with each other and the researcher rectangle box represented the various universities collaborating with others through the Drug Policy Futures group.